Wilderness Fire Planning

A guidebook to reestablishing the role of fire in wilderness ecosystems.

Produced by
Arthur Carhart National Wilderness Training Center
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USDA Forest Service, USDI Bureau of Land Management, National Park Service and the Fish & Wildlife Service

Acknowledgements

Contributors

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Compilers

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Forward

Background

The 1988 fire season was significant for all four federal land management agencies. Following that season, a review was conducted to identify ways that agencies could be more prepared should another such season occur. As a result of that review, the following points must be addressed by all agencies in their overall management plans:

*Fire History

*Objectives

*Skills and Qualifications

*Funding Requirements

*Inter and intra-agency coordination

*Inform and Involve actions

*Risks involved and potential impacts of plan implementation

*Fuel treatment measures needed to reduce hazard fuels in support of prescribed natural fires.

*Monitoring and evaluation

It has been nearly ten years since these new directives were passed down and in that time only a handful of plans for the use of prescribed fire in wilderness have been approved. Because the implementation of a prescribed fire program hinges on approved plans, managers are concerned that until a smoother process for developing plans is implemented, fire will continue to be excluded from wilderness. To provide a consistent process for addressing the required points, the idea of a guidebook was spawned. To best facilitate this project on a national and interagency level, the task of developing this guide was assigned to the Arthur Carhart National Wilderness Training Center.

This guidebook was a joint effort between fire, wilderness and planning folks from all four wilderness managing agencies. Though many of the examples found within are from Forest Service documents, they are pertinent to all agencies. This document has undergone close scrutiny from numerous people from all types of jobs at all levels of the four agencies.

Improvements

When the document was drafted the contents and examples were considered "state -of-the-art." It is assumed that as fire plans are approved they will also improve. The looseleaf style notebook will allow for updated and improved information to be included in the guidebook.

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2. Longlead Pine/Wiregrass. Alexander Springs Wilderness Fire Plan. National Forests in Florida.

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6. Operational Plan. Bridger Wilderness Fire Management Plan. Bridger-Teton National Forest.

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8. Prescribed Natural Fire Management Qualifications. Alpine Lakes Wilderness Prescribed Natural Fire Management Action Plan, April 1993. Wenatchee and Mt. Baker/Snoqualmie National Forests.

9. Skills and Qualifications. Gospel-Hump Wilderness Prescribed Natural Fire Management Guidebook, 1993. Nez Perce National Forest.

10. Funding Requirements. Eagle Cap Wilderness Fire Management Plan, July 1992. Wallowa-Whitman National Forest.

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12. Funding Requirements. Alpine Lakes Wilderness Prescribed Natural Fire Management Action Plan, April 1993. Wenatchee and Mt. Baker/Snoqualmie National Forests.

13. Inform and Involve Plan. Absaroka-Beartooth Wilderness Fire Management Guidebook, July 1993. Custer and Gallatin National Forests.

14. Inform and Involve Action Plan. Alpine Lakes Wilderness Prescribed Natural Fire Management Action Plan, April 1993. Wenatchee and Mt. Baker-Snoqualmie National Forests.

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20. Air Quality/Smoke Management Guidelines. Yellowstone National Park Wildland Fire Management Plan, April 1992.

21. Cultural Resources Protection Guidelines. Aldo Leopold and Gila Wilderness Prescribed Natural Fire Plan, June 1993. Gila National Forest.

22. Standards and Guidelines for Fire Suppression in Chinook Salmon Watersheds. Nez Perce National Forest.

23. Drought Assessment. Bob Marshall Wilderness Complex Guidebook on Prescribed Natural Fire, July 1990. Flathead, Lolo, and Lewis and Clark National Forests.

24. Identification of Fuel Treatment Measures. Prescribed Natural Fire in the Selway-Bitterroot Wilderness, May 1990. Bitterroot, Lolo, Nez Perce, and Clearwater National Forests.

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27. Prescribed Natural Fire Burn Plan. Anaconda-Pintler Wilderness Fire Management Guidelines, April 1993. Beaverhead, Deerlodge, and Bitterroot National Forests.

28. Prescribed Burn Unit Plan. Wildland Fire Management Guidelines. USDI National Park Service, June 1990.

29. Prescriptions. Yosemite National Park Fire Management Plan May 1990.

30. Fire Management Prescriptions. Bridger Wilderness Fire Management Plan. Bridger-Teton National Forest.

31. Public Safety. Absaroka-Beartooth Wilderness Fire Management Guidebook, July, 1993. Custer and Gallatin National Forests.

32. Wilderness Visitors Caution. USDA, Forest Service.

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34. Wilderness Visitors Information. Teton Wilderness. Bridger-Teton National Forest.

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46. Minimum Impact Suppression Tactics. Francis Mohr, Wallowa-Whitman National Forest.

INTRODUCTION

"The earth,
born in fire,
baptized by lightning,
since before life's
beginning
has been and is,
a fire planet."

E.V. Komarek

Introduction

Getting Started

As a starting point for this project wilderness fire plans and supporting documents from the four agencies that manage wilderness, Forest Service, National Park Service, Fish and Wildlife Service and Bureau of Land Management, were collected and reviewed. From these documents a draft outline for writing wilderness fire plans was developed and circulated for review. An interagency group of fire managers, wilderness managers, and environmental planners met in Missoula, Montana on August 2 and 3, 1993 to review the draft outline and decide how to proceed with development of a guidebook.

The task force realized that the assignment of producing a guidebook, especially on an interagency scale, was much more complex than originally thought. Policies and procedures for implementing wilderness fire varied tremendously between agencies. Regardless, this guidebook will provide information and examples to assist with integration of fire into long range planning efforts.

One of the biggest questions the task force dealt with was where exactly does a prescribed fire plan fit into the overall planning process. There is agreement that a separate plan should not be written for a wilderness fire program. Fire should be incorporated into the overall programmatic level planning for a particular Forest, Park, Refuge or District. However, in the case of the Forest Service, each forest is in differing stages of programmatic plananing. Some forests have recently produced a forest plan and will not be doing revisions for nearly ten years. In this case, an amendment provides the direction necessary to implement a prescribed fire program immediately.

Whether a unit plans to include wilderness fire planning in their programmatic planning process or write an amendment there are basic tenets that need to be addressed prior to the implementation of a prescribed fire program. This guidebook provides planners with information and examples that will be helpful in their planning efforts.

Using the Guidebook

This guidebook is designed to help with planning for a fire program in wilderness or other wildland areas and is divided into four sections; Introduction, The Planning Process, Componenets of Planning and References. Each section contains general information about the section topic and specific examples from existing approved plans. A discussion of each of the items that were identified in the 1988 fire season review is included in this guidebook along with other relevant topics. The extent of the discussion may differ with each wilderness. The contents and examples relate specifically to the points that are pertinent to all of the wilderness managing agencies.

Specific flow charts are provided for each federal agency that manages wilderness. The flow charts are designed to show the generally accepted planning process for that agency. Regional or local policy may deviate slightly from the flow charts displayed.

Begin by reviewing the flow chart and associated write up for your agency, and determine where you are in the process and what step is most logical to pursue next. Consultation between fire managers, wilderness managers, and National Environmental Policy Act (NEPA) coordinators is critical at this stage. Everyone should be in agreement as to the direction of subsequent efforts and decide what type of NEPA or non-NEPA document should be pursued.

The following chart lists the components of the plan and suggests in which planning document the components would best be included.

Comprehensive Plan **Forest Plan** **Guiding NEPA documents**	**Operations Plan** **Fire Management Action Plan**
Role of Fire in Wilderness	Drought Assessment
Fire Management Units or Zones	Fire Management Units or Zones
Wilderness resource Goals & Objectives	Communications Plan
Prescribed Fire Qualifications	Wildfire Suppression (MIST)
Funding (pnf)	Funding (mgmt. ignited)
Communications Plan	Prescribed Fire Qualifications
Risk Assessment (associated w/ alternatives)	Risk Assessment (go/no go decision)
Smoke Management	Safety
Natural & Social Considerations	Monitoring & Reporting (details)
Fuel Treatment for Hazard Reduction	Burn Plan
Safety	Prescriptions
Monitoring & Reporting (overview)	

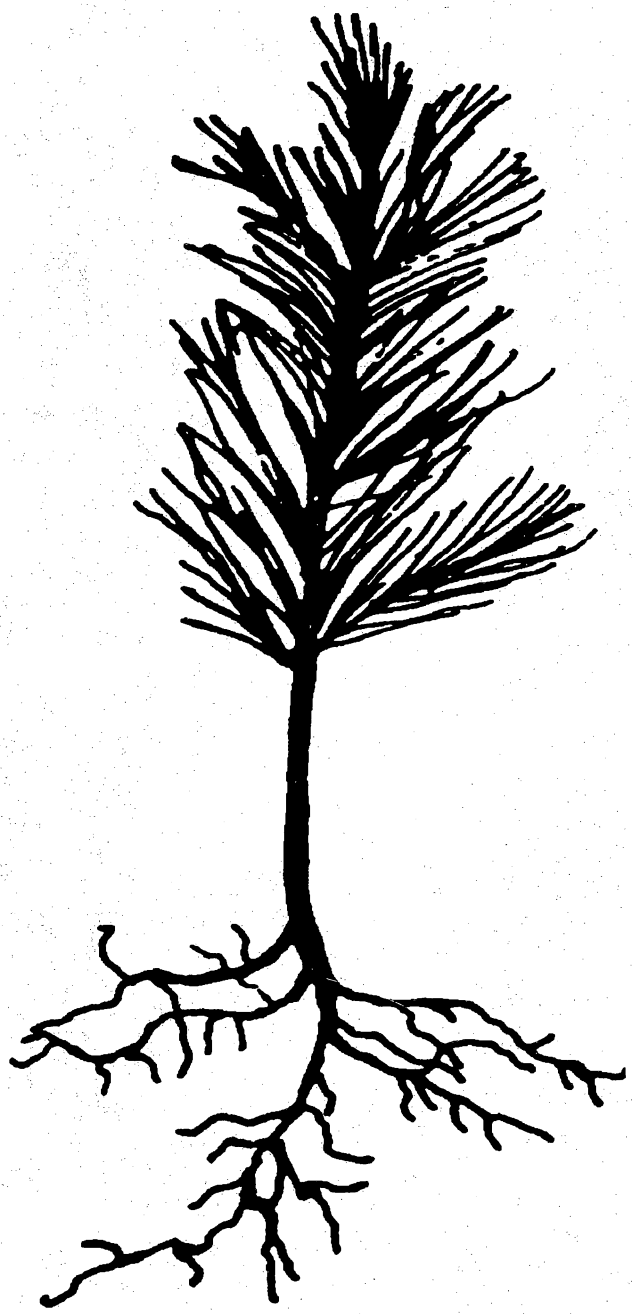
Attachments (to either Guiding NEPA Document of Operations Plan)

Glossary	Maps
Fuel Models	Weather Records
Summary of Public Comment	Cultural Report
References	Annual Program Cost Appraisal
Biological evaluations - Threatened & Endangered Species Analysis	

THE PLANNING PROCESS

"When you try to change any single thing, you find it hitched to everything else in the universe."

John Muir



Agency Direction

Background

One of the first steps in developing a plan for prescribed fire in wilderness is to recognize and understand all of the existing direction and policy that influence management decisions. A review of the Wilderness Act and the enabling wilderness legislation is a good place to start. (See Appendix)

In addition to the legislation, agency policy on wilderness and fire management should be reviewed thoroughly. Listed below are the documents for each agency that provide the necessary direction.

Forest Service

Forest Service Manual 5140 - Prescribed Fire

Forest Service Manual 2320 - Wilderness Management

Forest Service Handbook 5109.19 - Fire Management Analysis and Planning Handbook

National Park Service

NPS - 2 - Planning Process Guidelines

NPS - 18 - Wildland Fire Management Guidelines

NPS - 77 - Natural Resources Management

Fish and Wildlife Service

Wilderness Area Management Policy - 610 FW

6 RM 7 - Fire Management

6 RM 8 - Wilderness Management

Bureau of Land Management

Bureau Manual Section 9211 - Fire Planning

Bureau Manual Section 9214 - Prescribed Fire Management

Bureau Manual Section 1625 - Resource Management Planning

Handbook (H-8561-1) Wilderness Fire Planning

Handbook (H-9217-1) Fire Effects Handbook

In addition to national direction, regional and local supplements to the agency manual may also exist and should be reviewed. Regional or local supplements may provide more specific direction on what level of NEPA analysis is required and what types of documents will ensue.

Agency Specifics & Flow Charts

Before beginning an effort to reestablish fire in a wilderness, a decision must be made about where in the overall planning process documentation will occur. This will vary greatly depending on the circumstances of the individual wilderness.

The Department of Interior has department-wide policies allowing the use of prescribed fire (both natural and management ignited) in wilderness. The Bureau of Land Management (BLM), Fish and Wildlife Service (FWS) and National Park Service (NPS) also have a national policy that permits and promotes prescribed fire in wilderness.

Forest Service national manual direction requires that prescribed natural fire and management ignited fire be included at the Forest Plan level. This requirement is slightly different than the approach taken by the Interior agencies.

2 The Planning Process

National Park Service

The flow chart on the following page displays the general process for National Parks to address wilderness prescribed fire in General Management Plans (GMP), implementation plans, and Prescribed Natural Fire (PNF) or management ignited burn plans.

Prior to consulting the chart, park managers should first review the park's enabling legislation and the park Statement For Management (SFM). If issues and objectives for wilderness fire are not clearly set forth in the SFM, they should be added to the next update (usually scheduled for every two years).

The first step displayed in the flow chart is the review of the General Management Plan for direction on use of prescribed fire in wilderness. Wildernesses should be separate zones within this plan. If it is determined that the direction is inadequate, the plan should be revised.

After the GMP has been reviewed the park implementation plans should be reviewed. Normally, the park Resource Management Plan (RMP) will include a subsection on wilderness, however, a separate Wilderness Plan may have been prepared. If the direction contained in these plans is inadequate, they should be revised.

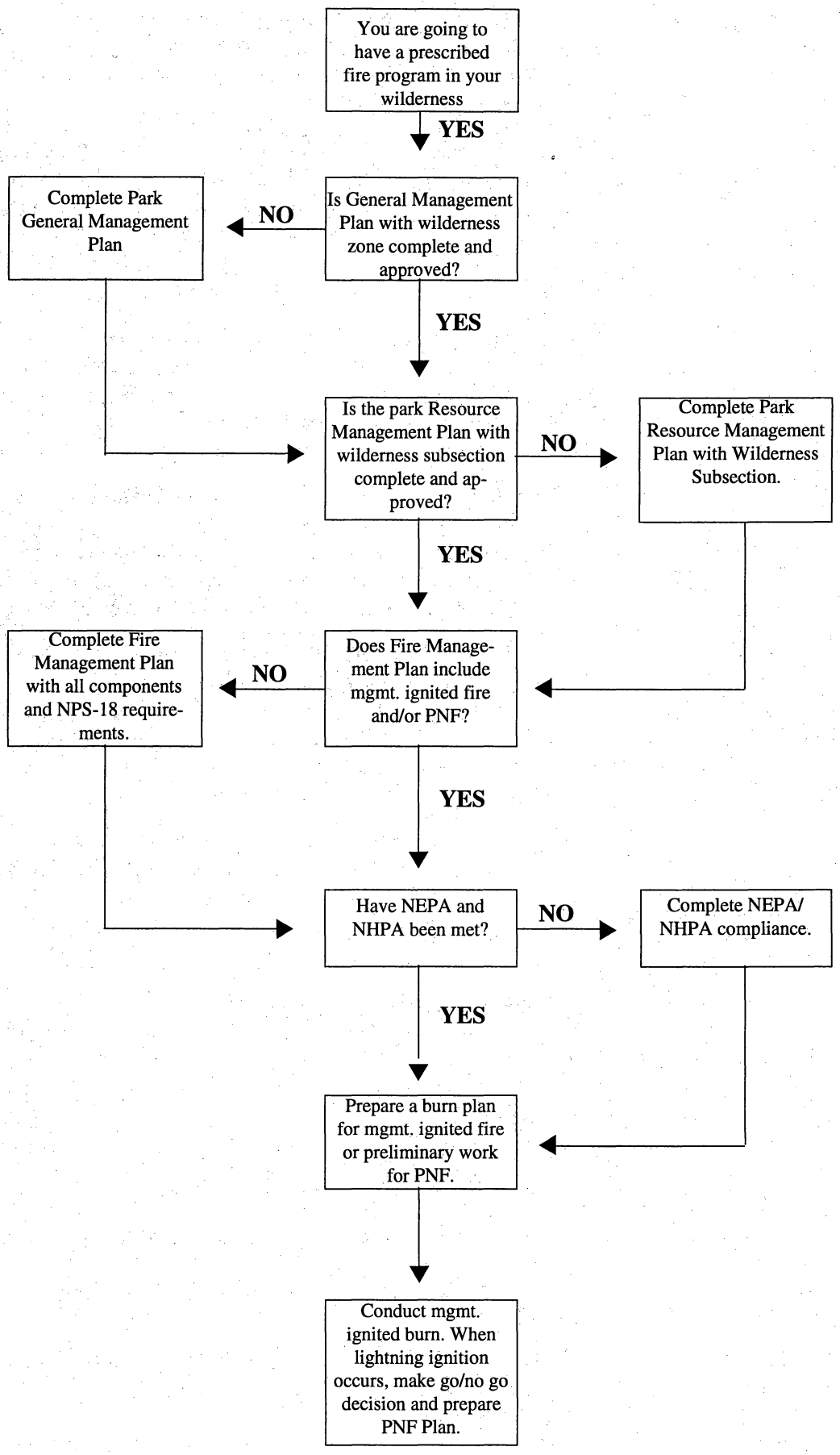
After reviewing the RMP the park Fire Management Plan (FMP) should be reviewed to see if it adequately addresses management ignited fire, PNF components, and meets the NPS-18 requirements. If it is determined that the direction is inadequate, all the necessary components should be added to the FMP.

NEPA analysis and decision should have been accomplished during preparation of the above listed documents. At this time, you should verify that both NEPA and National Historic Preservation Act (NHPA) compliance have been met. If not, the appropriate analysis or surveys must be conducted.

At this point the prescribed burn plan should be completed for any planned management ignited burns and any additional pre-ignition planning for the PNF program. The final step in this general process is making the "Go/No Go" decision for a PNF when a lightning ignition occurs in the Wilderness, or conducting the management ignited burn when conditions are appropriate. The PNF burn plan is finalized after a "GO" decision is made. Both management ignited fires and PNF's must be in full compliance with all requirements set forth in NPS-18.

For most National Parks the process should flow as above, however, some individual units may vary the process slightly.

National Park Service


You are going to have a prescribed fire program in your wilderness
YES
Is General Management Plan with wilderness zone complete and approved?
NO
Complete Park General Management Plan
YES
Is the park Resource Management Plan with wilderness subsection complete and approved?
NO
Complete Park Resource Management Plan with Wilderness Subsection.
YES
Does Fire Management Plan include mgmt. ignited fire and/or PNF?
NO
Complete Fire Management Plan with all components and NPS-18 requirements.
YES
Have NEPA and NHPA been met?
NO
Complete NEPA/ NHPA compliance.
YES
Prepare a burn plan for mgmt. ignited fire or preliminary work for PNF.
Conduct mgmt. ignited burn. When lightning ignition occurs, make go/no go decision and prepare PNF Plan.

2 The Planning Process

Bureau of Land Management

The flow chart on the following page displays the general process for BLM units to prepare Resource Management Plans (RMP's), Wilderness Management Plans (WMP's), Fire Management Activity Plans (FMAP's), and Prescribed Fire Plans (PNF and management ignited).

The first step is to review the RMP for land use allocations and general wilderness objectives and the standards and guidelines for fire management. If it is determined that these elements and the direction are inadequate the District should amend the RMP, which may necessitate a NEPA analysis if the changes are significant and the new text cannot be derived from the original RMP. Guidance on providing fire management input into an RMP are found in the BLM Manual and Handbook.

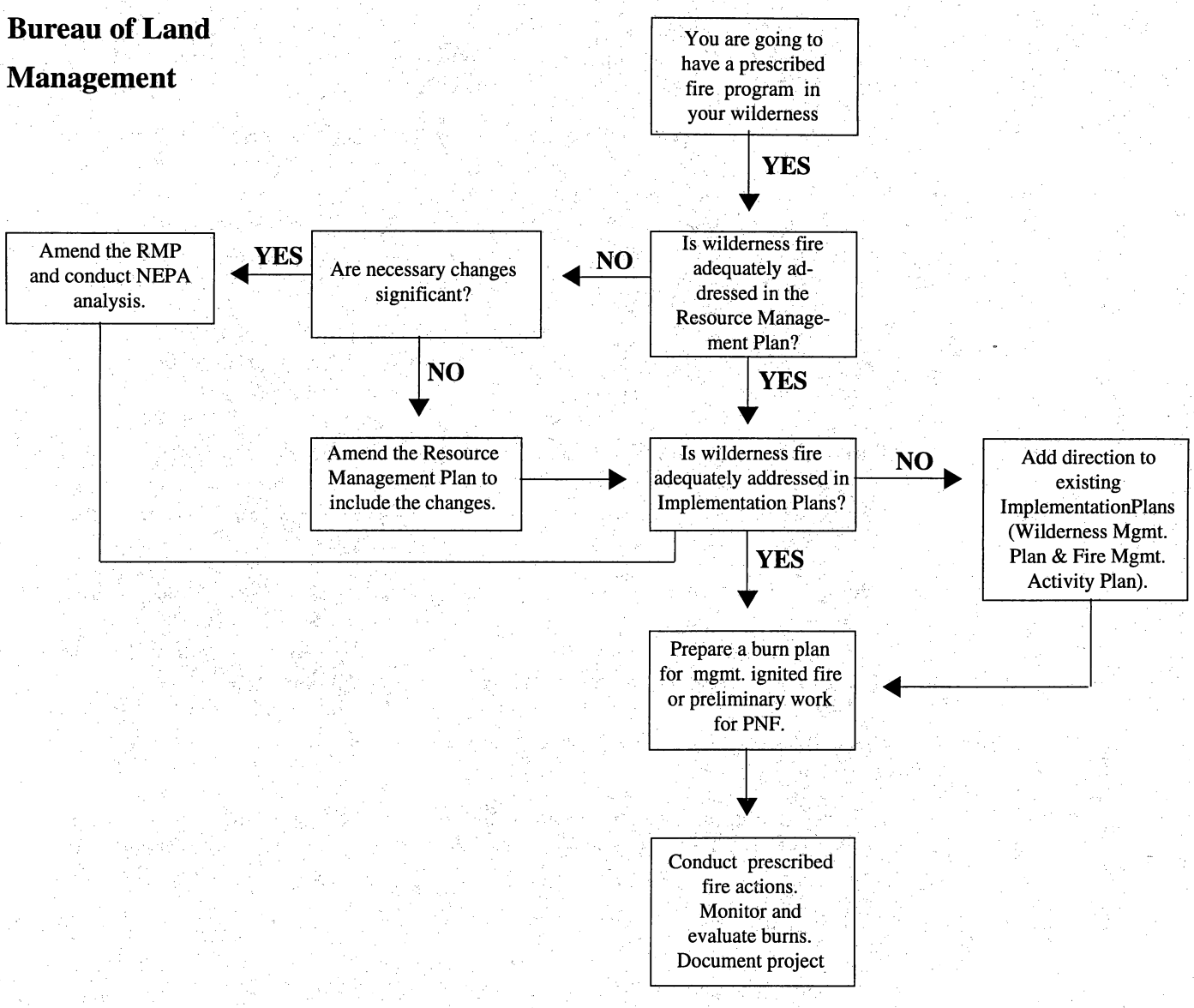
After this programmatic level of analysis has been added to the RMP, or if it was included originally, the next step is to examine the WMP and FMAP to see if these plans contain the specific wilderness management fire-related objectives, special considerations, and activity level direction. If the direction in these implementation plans is inadequate they should be revised.

The next step is to prepare the operational plans (PNF or management ignited) for the wilderness fire program. The final step in this general process is to utilize the "Go/No Go" decision tree for PNF when a lightning ignition occurs, or conduct the management ignited burn when conditions are appropriate. The PNF burn plan is finalized after a "GO" decision is made and the PNF is monitored.

The RMP, WMP and Fire Operational Plans involve NEPA compliance. The FMAP does not require compliance because it is primarily a workload analysis and organization determination process. An example of operational NEPA compliance is as follows: once a prescribed fire plan is written the local line manager is responsible for preparing an environmental assessment. This step may result in a categorical exclusion (CE), or a finding of non-significant impact (FONSI) determination.

This is the standard process for the BLM Districts. However, some individual units may need to vary the process to meet their specific needs for unique circumstances.

Bureau of Land Management


You are going to have a prescribed fire program in your wilderness
YES
Is wilderness fire adequately addressed in the Resource Management Plan?
NO
Are necessary changes significant?
YES
Amend the RMP and conduct NEPA analysis.
NO
Amend the Resource Management Plan to include the changes.
YES
Is wilderness fire adequately addressed in Implementation Plans?
NO
Add direction to existing ImplementationPlans (Wilderness Mgmt. Plan & Fire Mgmt. Activity Plan).
YES
Prepare a burn plan for mgmt. ignited fire or preliminary work for PNF.
Conduct prescribed fire actions. Monitor and evaluate burns. Document project

Fish & Wildlife Service

The flow chart on the following page displays the process for preparing wilderness fire direction for Refuge Comprehensive Plans, individual operational plans, and PNF or management ignited prescribed fire plans.

The Refuge Comprehensive Plan may or may not directly address wilderness prescribed fire. Inclusion of wilderness fire is not required in the Comprehensive Plan. However, direction in the individual operational plans (i.e. Refuge Wilderness Plan) must follow the broad guides and alternatives of the Comprehensive Plan. Wilderness prescribed fire direction should be incorporated into the Comprehensive Plan at the next scheduled revision.

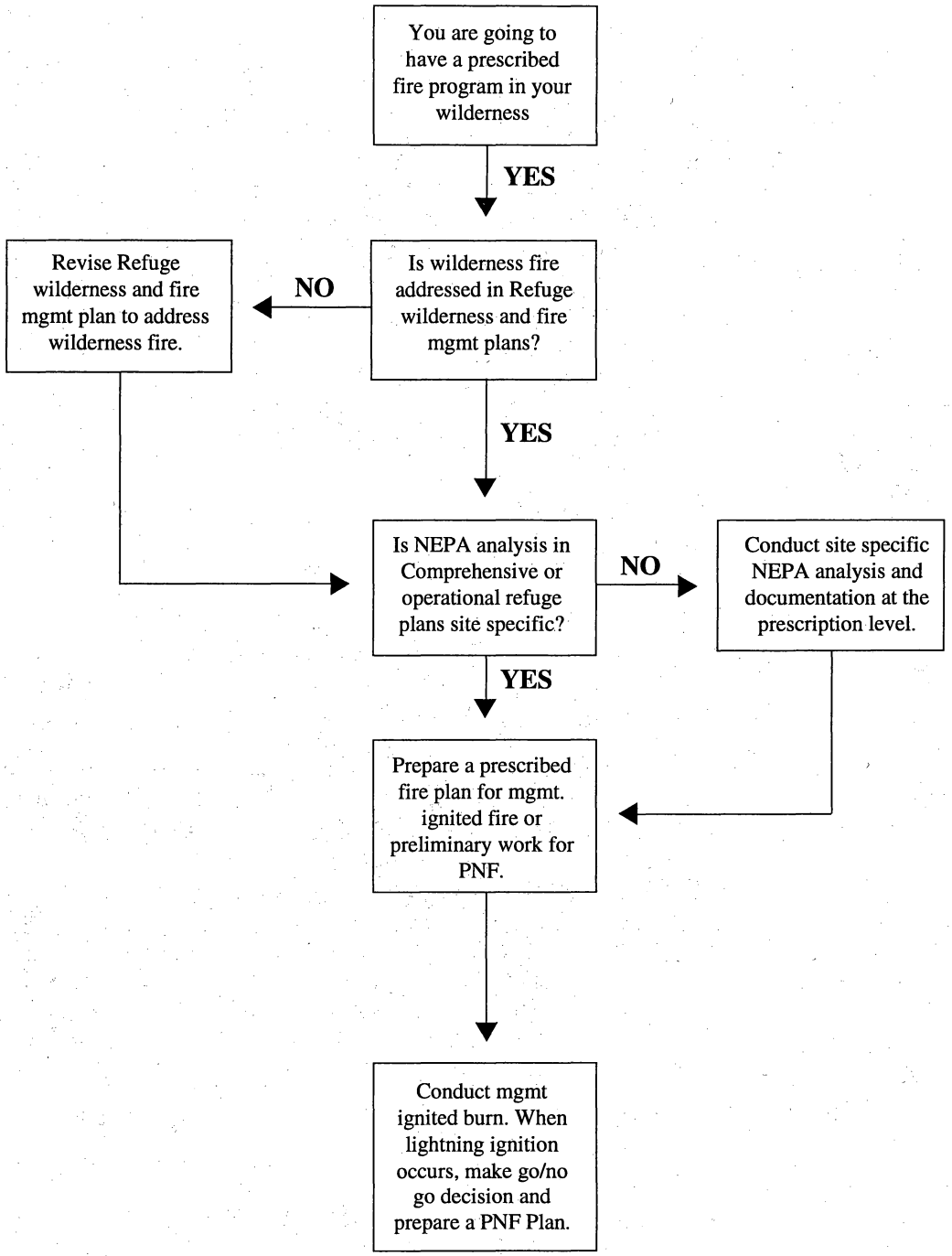
The first step, as identified in the flow chart, is to review the appropriate individual operational plans. This may include the Wilderness Plan if it has been produced, the Fire Management Plan, and other plans covering special aspects of refuge management. If it is determined that the direction contained in the individual plans does not adequately address wilderness prescribed fire the plan must be revised to add the appropriate direction. Revision of refuge operational plans may or may not involve a NEPA analysis and decision, depending on how the topic was covered in the Comprehensive Plan.

After appropriate direction has been added to the refuge operational plans, or if it were included originally, the next step is to prepare the prescribed fire plan for any planned management ignited burns and/or the prescription and pre-ignition planning for the PNF program. If the NEPA analysis in either the Comprehensive Plan or the operational plans is not site specific enough then that site specific NEPA analysis should be conducted in conjunction with the prescription preparation leading to the burn plan.

The final step in this general process is making the "Go/No Go" decision for a PNF when a lightning ignition occurs in the wilderness, or conducting the management ignited burn when conditions are appropriate. The PNF burn plan is finalized after a "GO" decision is made.

For most units within the National Wildlife Refuge System the process should flow as above, however, some individual units may vary the process slightly to meet their needs.

Fish &Wildlife Service


You are going to have a prescribed fire program in your wilderness
YES
Is wilderness fire addressed in Refuge wilderness and fire mgmt plans?
NO
Revise Refuge wilderness and fire mgmt plan to address wilderness fire.
YES
Is NEPA analysis in Comprehensive or operational refuge plans site specific?
NO
Conduct site specific NEPA analysis and documentation at the prescription level.
YES
Prepare a prescribed fire plan for mgmt. ignited fire or preliminary work for PNF.
Conduct mgmt ignited burn. When lightning ignition occurs, make go/no go decision and prepare a PNF Plan.

2 The Planning Process

Forest Service

The flow chart on the following page displays the processes for National Forests to prepare Forest Land Mangement Plans, Fire Management Action Plans (FMAP), or management ignited burn plans.

The first step is to review the forest plan for definitions of the Desired Future Conditions, Standards and Guidelines, and Monitoring requirements, as well as compliance with FSM 5142.21 and FSM 2324. During the review consider whether: 1) Forest plan direction is compatible with an ecosystem approach to fire management ("Fire Related Considerations and Strategies in Support of Ecosystem Management" - WO Staffing Paper - January, 1993). 2) Forest plan direction and monitoring requirements are adequate for implementing a prescribed fire (natural or management ignited) program. 3) Adequate direction exists for protection and/or management of threatened, endangered, and sensitive species habitat, cultural resources, and special sites.

If it is determined that forest plan direction does not adequately address wilderness prescribed fire there are two options to consider depending on timing of the forest plan revision. The first option is to make necessary changes during the scheduled forest plan revision. If the forest plan is not scheduled for a timely revision, the Forest could conduct a NEPA analysis of wilderness fire that will result in a decision document and an amendment to the existing forest plan. This will put you a step ahead when you do begin forest plan revisions.

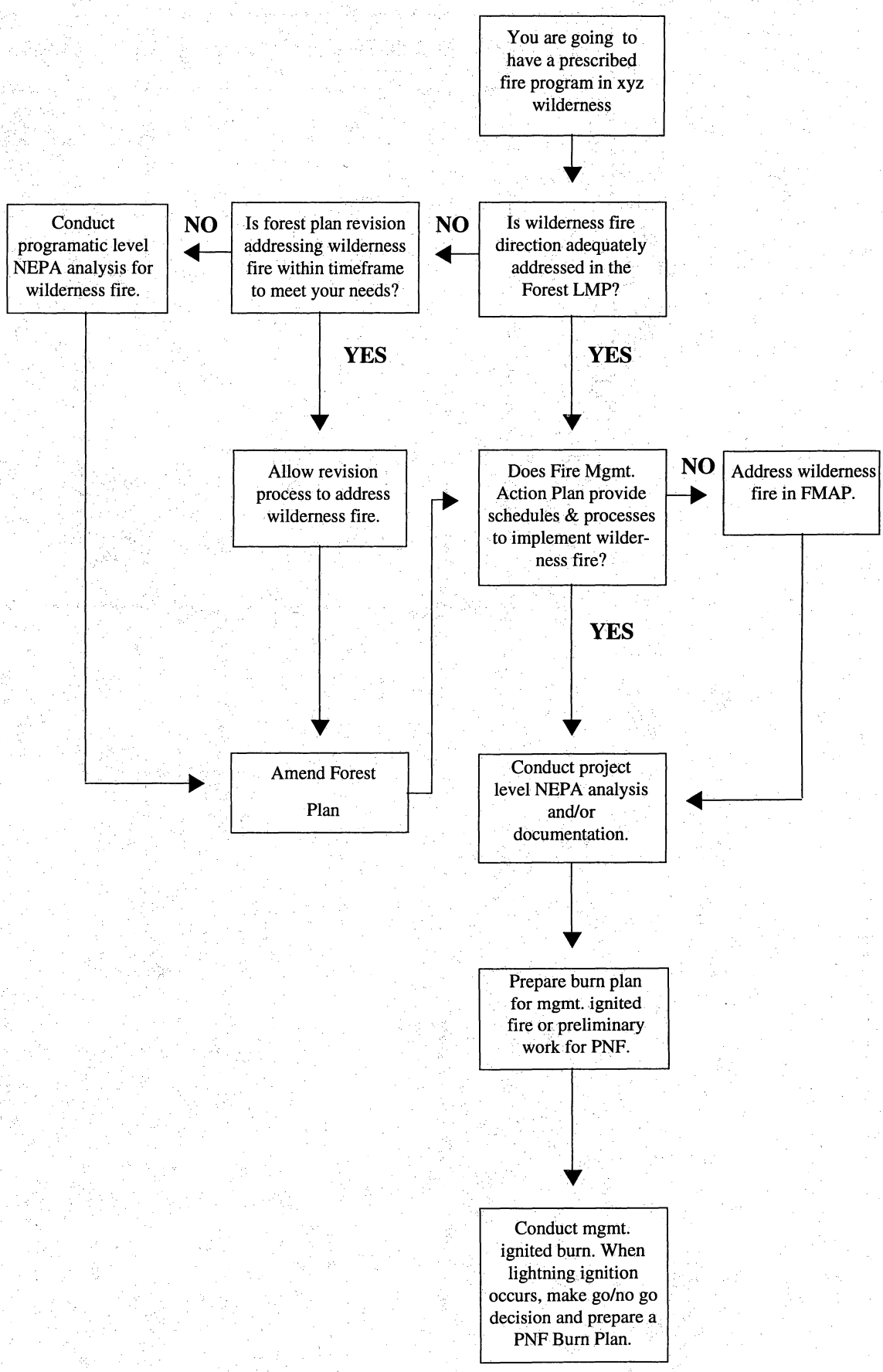
After the programmatic level of analysis has been added to the forest plan, or if it were included originally, the next step is to examine the forest Fire Management Action Plan (FMAP). If prescribed natural fire (PNF) is planned and the FMAP does not address the requirements in FSM 5142.22 it must be modified to include those items. If management ignited fires are proposed, the associated costs and timeline should be included in the wilderness implementation schedule.

The next step involves preparing a site-specific NEPA analysis and decision documents for management ignited fire. This level of analysis is not expected for PNF's. Following this, individual burn plans can be prepared for management ignited burns, and any other pre-ignition planning should be completed for the PNF program.

A major step in this general process is making the "Go/No Go" decision for a PNF when an ignition occurs in the Wilderness, or conducting management ignited burns when conditions are appropriate. A flow chart for making the "Go/No Go" decision should be a part of the FMAP. The PNF burn plan is finalized after a "GO" decision is made.

For most National Forests the process should flow as above. However, some individual units may vary the process slightly. Depending on how specific Forest Plan direction is, some units may conduct the site-specific project level NEPA analysis before modifying the FMAP. This is not a problem as long as the necessary detail is included and the NEPA documentation is appropriate. Other variations may exist due to size, complexity of the individual Wilderness, and the degree of support of wilderness fire by affected publics.

Forest Service


You are going to have a prescribed fire program in xyz wilderness
Is wilderness fire direction adequately addressed in the Forest LMP?
NO
Is forest plan revision addressing wilderness fire within timeframe to meet your needs?
NO
Conduct programatic level NEPA analysis for wilderness fire.
YES
YES
Allow revision process to address wilderness fire.
Does Fire Mgmt. Action Plan provide schedules & processes to implement wilder-ness fire?
NO
Address wilderness fire in FMAP.
YES
Amend Forest Plan
Conduct project level NEPA analysis and/or documentation.
Prepare burn plan for mgmt. ignited fire or preliminary work for PNF.
Conduct mgmt. ignited burn. When lightning ignition occurs, make go/no go decision and prepare a PNF Burn Plan.

	GUIDING NEPA DOCUMENTS	OPERATIONAL DOCUMENTS
FS	Land Management Plan	Fire Management Action Plan
BLM	Resource Management Plan	Implementation Plans & Operational Plans
US F &WS	Comprehensive Plan	Individual Refuge Plans i.e Refuge Wilderness Plan Refuge Fire Mgmt Plan
NPS	Statement for Management and General Management Plan	Implementation Plans i.e. Resource Mgmt Plan Fire Management Plan Wilderness Mgmt Plan

COMPONENTS OF PLANNING

Started by lightning, that little smoke was an obvious part of the natural scene. . . And that certain life chains may thrive in the Wilderness, it should burn. But I wonder once discovered, if the adrenaline generated in men born of fire suppression will let that life giving spark over there on the mountain give life.
William Moore

Components of Planning

Role of Fire

Determining the natural role that fire plays in forming and maintaining a landscape is an essential ingredient of wilderness fire planning. Fires occur relatively quickly, but the effects may last over long time spans and influence patterns of vegetation and the distribution of wildlife over an entire region.

Fire has had a major effect in many of the plant communities throughout the United States. Tall grass prairies in the Mid-West are probably the most dependent on fire for their existence, with annual burns not uncommon. Even fire-free periods of five years could result in a change in the species composition in these communities. The major pinelands of the south, southwest, and Lake States have all been dependent on periodic burning for their maintenance. Even the classic "old growth" Douglas-fir communities of the Northwest require periodic fires to ensure the continued presence of Douglas-fir. These fires tend to be stand replacement events which provide an opportunity for early seral species to complete their life cycle. Each one of these communities has evolved over thousands of years, depending on fire for existence.

Exclusion of fire has changed vegetative communities. If wilderness is to provide that valuable link between modified and unmodified environments, it is imperative that fire play a more active role in maintaining wilderness ecosystems in the future. To accomplish this, managers must find the balance between managing to preserve the "natural conditions" of the wilderness and addressing societal concerns and values.

The magnitude, complexities, and extreme variability of the National Wilderness Preservation System provide challenges to allowing fire to begin returning to the environment either naturally or through managed ignitions.

An important factor in the success of a prescribed fire program in wilderness is the determination of the effects the fire regime has had on a particular ecosystem. Fire regimes have been described by factors such as crowning or surface, size of fire, return interval between fires, pattern on the landscape, season of burn, and intensity of burn. Parts of the country, such as the southeast, have considerable literature documenting these descriptors. Other parts of the country may have little documentation. Documenting fire regimes is important for a couple of reasons. First, the public has traditionally thought of fires as "destroying" a forest, and some land management agencies have perpertuated those ideas. One way to begin changing that way of thinking is by informing the public about the important role that fire has historically played in the maintenance of ecosystems. A second reason for interpreting the natural fire regime of an area is to try to replicate that regime either through management ignitions or prescribed natural fires.

Fire regimes may vary within a particular area. Parameters for prescribed natural fires or management ignited fires should be established based on this natural range of variability. For example, if a natural fire regime included very frequent, cool burning surface fires, but also included an occasional long return interval stand replacement fire then that stand replacement fire is within the natural range of variability and should be considered a potential prescribed fire.

Historical information such as fire scars and lightning occurence data will provide a good basis for recreating the fire regime for a wilderness. In addition to gathering

information on natural fire occurrence to help define the fire regime, data on human fire occurrence may be useful to some wilderness fire managers, particularly if they are trying to understand the pattern on the land.

Types of Prescribed Fire in Wilderness

Current national fire policy recognizes two types of fire, prescribed fire and wildfire.

Two types of PRESCRIBED FIRE may be approved for use within the wilderness:

1. those ignited by lightning and allowed to burn under prescribed conditions, and

2. those ignited by qualified agency personnel

Objectives for fire management in wilderness have been defined as:

1. permit lightning caused fires to play, as nearly as possible, their natural ecological role within wilderness.

2. reduce, to an acceptable level, the risks and consequences of wildfire within wilderness or escaping from wilderness.

Fire ignited by lightning may be permitted to burn as a prescribed natural fire if it meets planned, specified conditions.

Declaring a fire a WILDFIRE:

Human-caused fires do not meet the above criteria and will be considered wildfires requiring appropriate suppression response. If a lightning or management ignition does not meet prescription criteria at any point in time, it will be declared a wildfire and an appropriate suppression response will be taken. Once a fire is declared a wildfire, it cannot be managed as a prescribed fire.

Management ignited fire should not be used to achieve wilderness objectives where lightning-caused fires can achieve them.

These definitions and policies are the same for all four wilderness managing agencies.

List of Examples - Role of Fire

1. General Description of the Area; History (Including Fire History). Bob Marshall Wilderness Complex Guidebook on Prescribed Natural Fire, July 1990. Flathead, Lolo and Lewis and Clark National Forests.

2. Longlead Pine/Wiregrass. Alexander Springs Wilderness Fire Plan. National Forests in Florida.

3. Fire Management, David Cole and Peter Landres. Ecological Applications, Ecological Society of America. In Press, Summer 1995.

Example 3-1

General Description and Fire History in the Bob Marshall Wilderness

Source: Bob Marshall Wilderness Complex Guidebook on Prescribed Fire, July 1990.
Flathead, Lolo and Lewis and Clark National Forests

In 1899, H.B. Ayres surveyed the Bob Marshall Wilderness Complex on horseback. Ayres' survey came just after the area was set aside as the Lewis and Clark Forest Reserve and before the Forest Service came into existence. Ayres prepared a report for the U.S. Geodetic Survey that described the reserve's vegetative conditions and fire history. The report included a color-coded map that showed the Bob Marshall was open country and not the waves of timbered ridges we know today. This map, which can be found in Appendix J, includes the fires that burned from 1858 - 1898. The following table notes Ayres' estimates of the number of acres burned in the reserve during the 40-year period:

TABLE 1 - AREA BURNED BETWEEN 1858 AND 1898 IN THE BOB MARSHALL WILDERNESS COMPLEX

East of the Continental Divide	384,000 acres
Middle Fork of Flathead River	60,800 acres
South Fork of Flathead River and the Blackfoot Drainage	310,400 acres
Total	755,200 acres

These figures indicate that 31 percent of the reserve burned between about 1858 and 1898. Based on the mapping standards Ayres used these estimates are very conservative because areas with trees taller than 15 feet, or areas where 50 percent of the trees were still alive were not included. These young and partially burned stands are most likely represented on Ayres' map as the areas containing less than 2000 board feet of timber. If this area is included, about 55 percent of the Reserve may have been burned during the 40-year period.

Gabriel's fire history for the Danaher Creek drainage suggests that a large fire occurred somewhere in the Danaher drainage during each decade of the 19th Century.* While many of these fires were light underburns, the fires of 1809, 1844-47, and 1889 were severe and covered extensive areas. The fires of 1854-59, 1895 and 1910 were also severe but covered smaller areas. The extent of these fires is difficult to assess because they were largely stand replacement in nature and subsequent fires destroyed evidence from earlier events. The northern portion of the complex had major fires during 1889, 1893, 1903 ,1910, 1919, and 1926 with the 1910 fire covering about one-third of the area. Table 2 shows the estimated acres burned in the 1889 fire year. Figures for this fire year would be more precise since the burn was only 10 years old at the time of the survey.

TABLE 2 - AREA BURNED IN 1889 IN THE BOB MARSHALL WILDERNESS COMPLEX

East of the Continental Divide	339,200 acres
Middle Fork of Flathead River	60,800 acres
South Fork of Flathead River	198,400 acres
Blackfoot Drainage	112,000 acres
Total	710,400 acres

* - Gabriel, H.W., III, Wilderness Ecology: The Danaher Creek drainage, Bob Marshall Wilderness, Montana. Missoula, Mt.: University of Montana; 1976. 244 p.

3 Examples

The 1889 fire covered more than 29 percent of the total area of the Bob Marshall Wilderness Complex in one year.

As a result of the repeated large burns, sites were affected on a regular basis. The "natural" forest consisted of separate and overlapping burns in some state of early seral vegetation and isolated pockets of mature trees that had escaped the last one or two burns. A review of Ayres' map supports this picture as only 4 percent of the total study area had volumes greater than 5,000 board feet per acre. (See Table 3)

Table 3 - PERCENT VEGETATION COMPOSITION BY GEOGRAPHIC AREA FOR THE BOB MARSHALL WILDERNESS COMPLEX

Veg. Type	East of Cont. Div.	Middle Fork	South Fork	Black-foot R.	Reserve
Prairie	13	0	0	1	4
Barren	20	29	29	8	24
<2M bf/ac	18	16	26	17	21
2-5M bf/ac	5	31	12	5	12
Burned	44	24	27	69	36

Following is an examination of the fire history of individual areas in the Bob Marshall Wildeness Complex:

I. **Blackfoot and Lincoln Units (Blackfoot River)** - Appendix J

Based on Ayres' estimates, between 69 to 73 percent of the Scapegoat Wilderness burned in 1889. Ayres suggests that a major burn also occurred during the 1850's. Evidence of this burn can be found in tree age analysis but no estimate of area can be determined because of subsequent fires. Ayres does suggest that much of the 1889 burn was a reburn of this period.

> p.48 "About forty years ago, also, many fires occurred. Most of the burns of that time have been reburned since. Where not repeated, they have either been covered again by forest or they have become mountain barrens."

> p.72 "On the Blackfoot drainage about 175 square miles, ... have been burned over severely. Most of this area was burned, some of it for the second time in 1889. All the burns indicated on the map have been severe, ..."

The age of a number of the lodgepole pine stands sampled indicate that they were established in the 1820's. Other than scattered Douglas-fir found on dry exposures, no stands older than 185 years were found. These findings would suggest a major fire occurred in the Wilderness about every 25 years before 1889 and they were extensive enough to have covered all of the Scapegoat area at least once between 1820 and 1889. Of equal importance is the uniformity of the age of the tree cover prior to the Canyon Creek burn, which reflects the conditions described by Ayres in 1898 and subsequent fire protection.

II. **Birch Creek, Halfmoon, and Sun River B &C Units (East of Continental Divide)**

These units may have had the highest fire frequencies in the Complex because the fires were driven by prevailing westerly winds, and prairie fires ran upslope from the grass communities to the east. These fires may also have gotten into portions of the lodgepole pine types thereby increasing the frequency of underburning.

There is a concern that in these units a fire may burn out of the wilderness and onto private land, as occurred in 1988. A similar event occurred during the 1889 fire and was described by Philip Bean:

> "On that particular afternoon (September 1) that the fire made its worst run and the Bean boys were fleeing for their lives trying to keep ahead of it, and as they returned to their ranch at Bean Lake, which is a mile or two without the semi-forest foothill areas, they found that settlers of the region had nearly completed burning a fire line over the open rolling prairie grass lands nearly all the way from what is now the town of Augusta up to the foot hills on the Dearborn."

Ayres makes a number of comments about the stand conditions.

> p.38 "The eastern slope has been burned so much that there is little humus left, except in the lower foothills."
>
> p.39 Ear Butte south - "This area, with the eastern foothills northward has once been nearly all wooded, but frequent incursions of fire from the plains have reduced and even exterminated much of the forest..."
>
> p.61 "The extensive, almost continuous burns on the foothills once partially covered with limber pine (Pinus flexilis) have not been restocked and so far as covered with vegetation have only weeds and brush if recent, or beargrass and scant forage plants if old." Only about 6 percent of it is restocked and the remainder bristling with deadwood, standing or fallen..."
>
> p.45 "The areas having old mixed forests with a fair stock of young growth are very few on the eastern slope, except in some of the smaller valleys near the Continental Divide. Such areas occur on the headwaters of the Middle Fork and on the western tributaries of the North Fork of Sun River; also on the Middle Fork and on the lower half of the South Fork of Flathead River."
>
> p.58 "The areas of forest that have escaped the general burn of 1889 and the other and lesser fires, both prior and later, are few and excepting along Badger Creek, Birch Creek, the South Fork of Depuyer Creek, the North Fork of Teton Creek, the South Fork of Deep Creek, and portions of the valleys of Smith Creek and Dearborn Creek the areas are so small and so remote and inaccessible as to make the timber on them of no commercial value."
>
> p.61 "The condition of the burned land (which made up about 44 percent of the area) is most desolate. Only about 6 percent of it is restocked and the remainder bristling with deadwood, standing or fallen...only a scanty stock of weed, grasses, or brush."

It is obvious from these descriptions that the foothill areas which presently support limber pine were generally non-stocked. The remaining area was primarily stocked by lodgepole pine, but mature stands were small and scattered. Approximately 77 percent of the area was mapped as grassland, non-stocked or with trees less than 10 feet tall. The upper slopes are now covered with dense stands of lodgepole pine and many of the foothills have significant stands of limber pine.

Ill. **Ousel, Spruce Park, Schafer A&B, Sun River A Units (Middle Fork)**

Conditions in the Middle Fork typify a moister environment, but even here barren and recent burns make up 53 percent of the area. There is, however, 31 percent of the area with a reasonable stand of trees.

> p.66 "On the burned areas the trees killed by fire form a network over the ground, except where fires have been repeated and severe. On the unburned areas, covering nearly all of the two main forks of the valley, the old trees and others killed by overcrowding have fallen and such an amount of material has accumulated that it is difficult to take horses through the woods....The abundance of brush is a serious hindrance to the starting of seedlings."
>
> p.67 "The litter and brush make the trail through this valley almost impassable...About 95 square miles (17 percent)...have been severely burned within the past twelve years. The hills east of the river are almost barren as a result of fire...Probably not over 20 percent of the burns are restocked with seedlings of any species. The view over the mountains south of Bear Creek reveals a very few small unburned tracts in the most sheltered places, but the surface is nearly all bare, with the exception of a few dead trees, either standing or fallen."

The fire return interval appears to have been much longer and probably more typical of the models for the vegetative communities found here. The major change with fire exclusion is again the accumulation of biomass and the loss of open areas providing more continuous fuel beds.

IV. **Big Salmon, Danaher, Schafer C, and Chinese Wall Units (South Fork)**

The South Fork had about 56 percent barren or burned area with about 17 percent stocked to a reasonable degree.

> p.72 "...and on the South Fork of Flathead ... about 310 square miles (19 percent)... have been burned over severely...They frequently have a network of fallen trees, among which some dead trees remain standing."
>
> p.71 "With few exceptions, there is a fair stock of young trees throughout the forest. The tracts not burned have young trees coming in where the old have fallen. Most of the burns in the low country are being fairly restocked, but the burns of 1889 were so severe that reproduction on them, as found on Hungry Horse, Upper Gordon Creek, and the eastern slope of the Kalispell Range, has been scant."
>
> p.72 "In the valley of Willow Creek reproduction is especially good, and 40,000 young lodgepole pine to the acre are frequently found. Some of the damper areas have a stock of Engelmann spruce and red fir or larch. The areas subjected to repeated fires have very little new growth, and this is almost invariably lodgepole pine...These fires have greatly reduced the area of wood lands; in fact, the forest here is some 450 square miles less on account of them."

This area represents a transition between the dry types of the Scapegoat Wilderness and the wetter types found in the Middle Fork and lower South Fork drainages. As a result vegetative impacts also were more significant in the southern portion as compared to the lower South Fork.

Example 3-2

Fire History in Longleaf Pine/Wiregrass Ecosystems

Source: Alexander Springs Wilderness Fire Plan. National Forests in Florida.

Ecosystem Components

The longleaf pine/wiregrass community is an upland savanna-like ecosystem consisting of a longleaf pine overstory with a perennial ground cover of grasses, chiefly wiregrass. Deciduous oaks such as turkey oak, bluejack oak, blackjack oak, southern red oak, and sand post oak (often lumped under the term "scrub oaks") may form dense thickets, groves or open woodlands within the ecosystem. The longleaf pine/wiregrass association once stretched from Virginia to east Texas (Myers, 1991). But, due to extensive logging and human influences this ecosystem has been greatly reduced. It often acts as a transition community linking the longleaf-turkey oak association found on drier sandhills to the wetter pine flatwoods.

Fire seems to pervade every aspect of this ecosystem. Flowering and seed production of wiregrass is sluggish at best, and it is rare that it becomes established from seed. Wiregrass blooms profusely after a growing season burn and after defoliation or minor soil disturbance. The major form of spread seems to be the new growth from root stock after burning. In this respect, its existence may depend solely on fire; it has adapted to using fire as an auxiliary energy source for reproduction, conserving energy by not investing in elaborate reproduction mechanisms. Instead, its energy is put into producing a vigorous, dense ground cover that successfully prevents other species from establishing (Myers, 1991). In addition, wiregrass is highly flammable, ensuring its perpetuation and mutualistic relationship with longleaf pine.

Longleaf pine is classed as fire-resistant due to its adaptations to fire (Myers, 1991). Indeed, its entire life cycle is linked to fire. A light ground fire will remove the grasses and other fuels that act as barriers to the large seeds reaching the soil. Once burned, the probability of another fire within the next 1-2 years is reduced. In its first years, the "grass stage" of the longleaf is a dense tuft of moisture-laden needles which hide and protect the terminal bud. The moisture-laden needles help the seedling survive ground fires that would kill other species. During this stage it also produces a deep tap root which builds up reserves that will allow the seedling to shoot upwards a meter or more in one year, effectively taking it out of the fire's reach (Myers, 1991). Other adaptations to fire include a thick bark which inhibits heat penetration. Frequent fire also helps control brown spot disease, thus perpetuating longleaf (Clewell, 1971).

Fire Interval

The longleaf pine/wiregrass is a pyric system (fire controlled), requiring frequent low intensity fire occurring every 1-10 years. On the National Forests in Florida, prescribed burning of this type of ecosystem (within or outside of wilderness) is usually accomplished for fuel reduction purposes on a 3-5 year cycle. If fire doesn't occur within this 3-5 year cycle, the fuel buildup can then be termed unnatural.

Results of Fire Exclusion

When fire is excluded, fire-susceptible species are able to establish and dominate the landscape,creating a buildup of litter on the forest floor and further preventing establishment of longleaf. Elimination of fire would allow encroachment of woody species and succession toward a mesophytic mixed hardwood forest (Myers, 1991). However, it is important to realize that the longleaf pine/wiregrass association is not just a successional stage of a hardwood forest held in check by fire; it is an intricately evolved ecosystem linked to the return of frequent fire.

Example 3-3

Effects of Fire Management on Wilderness

Source: D. Cole and P. Landres. Ecological Applications, Ecological Society of America. In Press, Summer 1995.

Naturally-ignited fire significantly affects the composition, structure, and functioning of many different types of ecosystems. Fire occurs relatively quickly, but the effects may last over long time spans, and influence spatial patterns of vegetation and the distribution of wildlife over an entire region. Because naturally-ignited fire is such a key process, fire suppression causes wholesale ecological changes. These changes range from altered species distribution and population viability, to modified landscape-level spatial patterns of habitat types and seral stages. The importance of fire and impacts of fire suppression have long been understood (e.g., Weaver 1943), and naturally-ignited fire is recognized as a crucial factor in maintaining naturalness within national parks and wilderness (Parsons et al. 1986).

Fire regimes (occurrence, intensity, frequency, size, and pattern) in fire-dependent wilderness ecosystems vary from short-return-interval, low-intensity surface fires (e.g., in warm and dry ponderosa pine forests) to long-return-interval, stand-replacing fires (e.g., in cool and moist western cedar forests) (Kilgore 1987, Kilgore and Heinselman 1990). Over the short-term, the effects of fire suppression have been most pronounced in ecosystems with frequent to short fire-return-intervals (1-100 years) because technological advancements allowed active fire suppression only since the 1930s (Pyne 1987). It is more difficult to discern fire suppression impacts in ecosystems with longer fire return intervals (100 to more than 300 years) because they are likely to be still within the bounds of natural variation.

Fire suppression has influenced most aspects of wilderness ecosystems. The most visible effect has been on fuel accumulations, plant species composition and the distribution pattern of habitats (reviewed by Kilgore 1987). With fire suppression, shade-intolerant species (e.g., ponderosa pine) are typically out-competed by shade tolerant species (e.g., Douglas fir). These changes in species composition and forest structure have significant ecological effects, such as creating nearly ideal habitat for western spruce budworm outbreaks (Carlson et al. 1985). By influencing wildlife habitat, fire suppression affects composition of the wildlife community and the viability of species that are dependent on a shifting mosaic of habitat produced by fire. Kirtland's warbler , for example, nest only in fire-maintained jack-pine woodlands between 6 and 21 years old (Botkin 1990). By altering vegetation composition and promoting fuel build-up, fire suppression affects ecosystem processes in wilderness (reviewed by Kilgore 1987). Low-intensity surface fires, for example, facilitate nutrient cycling and increased soil fertility, while high-intensity fires driven by accumulated fuels volatilize many nutrients removing them from the soil (Boerner 1982). Barrett (1988) showed how fire suppression altered forest successional pathways in western coniferous forests, especially on cooler, moister north- and east-facing stands.

Likely the most significant impact of fire suppression has been on the landscape-level distribution and temporal variation of habitat types and seral stages. Fire typically creates a shifting mosaic of vegetation patches composed of different species, age-classes, and physiognomy. Over relatively small or large spatial and temporal scales, there is little apparent equilibrium or steady-state pattern of patch types, sizes, and dispersion (Turner and Romme 1994). For example, analyzing fire history in giant sequoia groves over the past 2000 years, Swetnam (1993) concluded that "over the long term, giant sequoia fire regimes were clearly nonstationary; fire frequencies and sizes constantly changed through time." Romme (1982) reached a similar conclusion for the subalpine forests of Yellowstone National Park, as did Baker (1989) for the Boundary Waters Canoe Area. This shifting mosaic allows a variety of species with differing requirements to coexist within a regional landscape. Fire suppression reduces or eliminates this spatial and temporal variation, holding a landscape static and reducing its biological diversity.

Restoring natural processes that occur over large areas and hundreds of years will be a formidable management challenge. Restoring natural fire regimes will be difficult because of the risk to property and visitors

both within wilderness as well as on adjacent lands, coupled with the traditional notion of fire "destroying" a forest. Furthermore, restoring fire (whether natural- or management-ignited) in long-return-interval forests will be especially difficult because of the high probability of stand-replacing crown fires in these systems. Restoring fire may also contribute to the loss of rare ecological entities in wilderness. Now that wilderness and other protected areas provide the last refugium for certain species or communities, a single fire may cause the extirpation of a population, species, or community.

Although we know more about fire and the effects of its management than many other threats to wilderness conditions, most of this knowledge is at the level of individual stands. The importance of fire and its suppression demands that we expand this effort to large spatial scales and long time frames. Critically needed are methods that allow rapid and accurate quantification of natural fire regimes over large areas (e.g., 10,000 ha and greater), and models that explain and predict spatial and temporal variation of fire regime in different types of environments (e.g., see Clark 1990). We need to understand how physical attributes (e.g., slope, aspect, elevation), historical climate conditions, and past disturbances interact to influence current fire probabilities, and the influence of these probabilities on landscape-level vegetation patterns as they change over short- and long-term time frames. Fire regimes are typically described in terms of a "mean fire-return-interval," but this traditional descriptor does not adequately convey either temporal or spatial variation; fire regimes may more accurately be described with a probability function for both spatial and temporal occurrence (e.g., Turner et al. 1994). In addition, impacts of dynamic vegetation patterns on wildlife distribution, abundance, and viability are poorly understood, even in game species where considerable effort has already been concentrated. Research on fire impacts to landscape-level linkages and permeability among landscape elements (e.g., to organisms, propagules, nutrients) is just starting. Although the impact of fire on a stand of trees is well known, the important long-term, large-scale implications of this impact are only now starting to be understood. This knowledge will be invaluable to managers charged with restoring and maintaining natural spatial and temporal patterns of fire in wilderness.

Fire Management Units and Zones

Fire Mangement Units (FMU) and Fire Management Zones (FMZ) are used to plan, implement and display the prescribed fire program in wilderness. Wilderness planners use FMU's and FMZ's to group areas with similar characteristics and constraints. FMU's and FMZ's can also facilitate interagency and intra-agency planning. The terms FMU and FMZ are interchangeable. The Forest Service has generally used the term FMU, while the Interior agencies have generally used FMZ. Some plans have used both, with one being a smaller delineation of the other.

Some elements to consider in deliniating a fire management unit are:

1. fire growth predictions, time of year, fuels, slope
2. fire regimes
3. intensity of prescribed fires
4. differences in ecosystems
5. sensitive areas
6. inholdings or historic structures
7. proximity to Wilderness boundary
8. cultural sites
9. values at risk immediately outside the boundary

Fire management boundaries do not have to follow wilderness boundaries. FMU's and FMZ's may include land adjacent to the wilderness boundary. The objectives outside wilderness will often be different from those inside because those objectives can be more definitive when determining the desired future conditon of a piece of ground. Boundaries selected need to be logical and defensible.

The procedures and data used for the deliniation of the FMU's or FMZ's should be documented in the guiding NEPA document or operational plan. Several examples for FMU's and FMZ's follow.

List of Examples - Fire Management Units and Zones

4. Fire Management Units and Zones. Absaroka-Beartooth Wilderness Fire Management Guidebook, July 1993. Custer and Gallatin National Forests.

5. Fire Management Situation. Yellowstone National Park Wildland Fire Management Plan, April 1992.

6. Operational Plan. Bridger Wilderness Fire Management Plan. Bridger-Teton National Forest.

Example 3-4

Fire Management Units and Zones

Source: Absaroka-Beartooth Wilderness Management Guidebook, July 1993. Custer and Gallatin National Forests.

The Absaroka-Beartooth (A/B) Wilderness has been divided up into six fire management units (FMU). Fire management units are generally large, homogeneous areas which possess boundaries that are natural barriers to fire spread. Topography, past fire patterns, vegetation, fuels, unique features, special uses and improvements, land ownership patterns, and fire management objectives (Fischer, 1984). Each fire management unit and its brief description follows, please refer to the FMU map accompanying this guidebook.

Paradise FMU - 1 - This fire management unit borders Paradise Valley to form the western boundary of the Wilderness. The unit stretches from Livingston south to Mill Creek. This unit either borders private land on the north, west, and south or the FMU boundary is within 2 miles of private land. The most prominent features of this unit are the West Boulder River Valley, the West Boulder Plateau, and the Paradise Valley Face. Summer homes and private inholdings are located in and around Mill Creek. The Thompson Creek fire, a major stand-replacement event, occurred here in 1991. High, rugged peaks, sheer faces, and deep canyons typify this FMU.

Hellroaring FMU - 2 - This is the largest FMU, and it is bordered to the south by Yellowstone National Park, to the west by the Yellowstone River, Mill Creek drains its northwestern boundary, the Boulder River Valley occurs to the north, and the Stillwater River forms the eastern boundary. Minimal private land surrounds this unit, but summer homes and mining activity are located in Jardine, around Cooke City, and Silver Gate. The major features of this FMU are Hellroaring Creek, Slough Creek, and the Stillwater River. Major stand-replacement fires burned in this unit in 1988, the Hellroaring, and Storm Creek fires. The Hellroaring FMU offers the best opportunities for implementing and managing prescribed natural fires. This FMU also provides critical habitat for the grizzly bear.

Boulder FMU - 3 - The Boulder River is a typical glacially scoured U-shaped valley 23 miles south of Big Timber. The valley is densely forested with a non-wilderness corridor running right up the valley bottom. This non-wilderness corridor varies from 1/2 to 2 miles wide at Independence. Many private inholdings and special-use cabins are located within this non-wilderness corridor, which presents a very complex wildland/urban interface.

Plateau FMU - 4 - This unit exists above 9,000 feet with broad alpine plateaus and granite peaks 2,000 feet above these plateaus. The plateaus exist at about 10,000 feet, while the peaks rise to over 12,000 feet. Much of the FMU consists of alpine turf, rock, snow, and ice. Continuous whitebark pine forests grow in some areas. Prominent plateaus are Lake, Stillwater, Fishtail Froze-to-Death, East Rosebud, Red Lodge Creek, Silver Run, Hellroaring, and the Beartooth. The majority of this FMU exists above timberline and possesses little fuels or continuous fuels. The Plateau FMU is located well away from most other land ownerships.

Beartooth Front FMU - 5 - This FMU contains all wilderness lands below 9,000 feet on the Beartooth District, except for the Stillwater River Valley (Hellroaring FMU). Most of the area occurs in northeast-trending glacially scoured valleys, except for the Lake Fork Rock Creek, which drains east, and the Red Lodge Creek front country. Part of the Red Lodge City Municipal Watershed (23,000 acres) exists in the West Fork Rock Creek. This FMU typically experiences either small fires less than 10 acres or stand replacement fires as evidenced by fire history analysis. Almost every valley contains campgrounds, special-use cabins, and private inholdings.

Clark's Fork FMU - 6 - This FMU is located southwest of the Beartooth Plateau on the Gallatin and Shoshone National Forests, and it is the smallest unit in the Wilderness. This country is described as wet subalpine meadow country, predominately sedges and willows, with scattered to continuous subalpine forest, and many lakes. The terrain is more gentle than north of the Beartooth Plateau, but this FMU is still rugged and rocky. Prominent

features are the Beartooth Plateau to the northeast, Beartooth Highway on the south, Beartooth Butte to the east, and Colter Pass to the west.

Interface Zone - This fire management zone consists of areas which are adjacent to wildland/urban interfaces, administrative sites, powerline facilities, and/or campgrounds. These zones are located within the Absaroka-Beartooth Wilderness, but they present an inherently higher risk for PNF management because of topography, wilderness boundary location, fuel types and loadings, prevailing weather patterns, and human developments. The "interface zones" are portrayed within fire management units and occur near fire management unit boundaries. "Interface zones" or areas influencing"interface zones" should be targeted for fuels treatment, fireproofing, and information outreach efforts specifically for land and property owners.

There are eight fire ecology groups present in the Absaroka-Beartooth Wilderness. These eight fire groups are fully described by Clayton and Fischer,1983b in Fire Ecology of Montana Forest Habitat Types East of the Continental Divide. Fire ecology group descriptions are:

Fire Ecology Group Zero - Special habitats existing on eastern Montana National Forests such as scree, forested rock, meadow, grassy bald, aspen grove, and alder glade. These special habitats do not burn under normal summer weather conditions. These areas can serve as anchor points for fuelbreaks and serve as boundaries for Maximum Allowable Perimeter delineation. Meadows and aspen stands provide important wildlife habitat.

Fire Ecology Group One - Dry limber pine habitat types that occur exclusively east of the Continental Divide in Montana. These habitat types occupy some of the driest sites capable of supporting trees. Limber pine is usually the only tree present, but Douglas-fir sometimes occurs as a codominant or intermediate stand component. Trees are generally stunted and rarely over 50 feet tall. Open stands with sparse ground cover can act as effective firebreaks.

Fire Ecology Group Five - Cool, dry Douglas-fir habitat types in which Douglas-fir is often the only conifer. Lack of fire promotes dense, Douglas-fir sapling understories, and multi-storied stand structures. These sites are usually too dry for lodgepole pine and too cold for ponderosa pine. Ground fires maintained many open stands in parklike conditions. Fuels are normally sparse, except where dense regeneration is present or insects and disease have caused mortality.

Fire Ecology Group Six - Moist Douglas-fir habitat types that will support large amounts of Douglas-fir even if subjected to periodic fire. Fire group six habitat types occur throughout eastern Montana. Douglas-fir tends to dominate most successional stages, but lodgepole pine is a major seral component on some sites. Fuel loadings are much heavier on these sites because of greater productivity. Fire thinned more open stands and completely replaced stands that had high fuel loadings, ladder fuels, and many stems per acre.

Fire Ecology Group Seven - Cool habitat types typically dominated by lodgepole pine. Fire maintains lodgepole pine as a dominant seral species and as a persistent dominant in latter successional stages. Lodgepole pine dominates sites either because it is the only species that occurs there (edaphic climax) or fire eliminates other conifer species. Below 7,500 feet elevation fire maintains lodgepole pine, because periodic disturbance eliminates the understory Douglas-fir, subalpine fir, and Engelmann spruce. Above 7,500 feet the fire season is much shorter, the fire return interval much longer (150-300 years), the mountain pine beetle cannot survive and reproduce very well. Shade tolerant species emerge through the overstory resulting in a greater diversity of age classes and vegetation species. Periodic crown fires play a significant role in the development of these lodgepole pine forests.

Fire Ecology Group Eight - Dry, lower subalpine habitat types that usually occur as mixed Douglas-fir/lodgepole pine forests. Periodic wildfire sets back succession and removes subalpine fir and spruce thus favoring Douglas-fir and lodgepole pine. Low to moderate ground fires favor the more fire-resistant Douglas-fir, while stand-replacement fires will favor lodgepole pine. Severe fire weather conditions combined with hazardous fuel loadings encourage stand-replacement fire events. Low to moderate severity fires have little effect on the overstory, maintains more open stands, and may boost forage productivity. The variety of fires occurring in these habitat types create vegetative mosaics that provide diverse wildlife habitats, diverse scenery, and enhanced recreational opportunities.

Fire Ecology Group Nine - Moister, lower subalpine habitat types where fires are more infrequent, but more intense. Spruce is usually a major component of early seral stands. Fire group nine sites typically border streams and adjoin wet meadows. Soils are moist or wet much of the year, and elevations range from 5,800 to 8,200 feet. The absence of spruce and subalpine fir indicates past fires. The codominance and abundance of spruce, lodgepole pine, and Douglas-fir indicate past fire intensity and time since the last fire. Subalpine forests generally exhibit multiple stories and age classes. These sites are very diverse due to patchy, variable intensity burns, microclimate, and soils.

Fire Ecology Group Ten - Cold, moist upper subalpine and treeline habitat types. Fire in these high-elevation habitats is infrequent and small in size because fuels are discontinuous and fuel loadings are low. All sites are above the cold limits for Douglas-fir, and many sites are above the cold limits for limber pine and lodgepole pine. Whitebark pine, Engelmann spruce, and subalpine fir grow in groups with sparse understories and minimal fuels. Site factors, like climate and soil, dictate the processes at timberline more so than fire does. Lightning will start fires, but the lack of fine fuels and rain accompanying thunderstorms usually limits fire intensity and extent. Stand-replacement fires occur at long intervals (200-300 years) in more continuous forests, and ground fires have occurred in whitebark pine stands with ample fine fuels and absence of shade-tolerant tree species.

Example 3-5

Fire Management Situation

Source: Yellowstone National Park Wildland Fire Management Plan, April 1992.

A. Fire Management Zones

The Wildland Fire Management Plan divides Yellowstone into three management zones: Suppression, Conditional, and Prescribed Natural Fire. These zones are established for different purposes. In the Suppression Zone personal safety and protection of property is of primary importance. In the Conditional Zone the dual purposes of allowing prescribed natural fires to burn within certain prescriptions and the protection of life and property within and outside park boundaries from unwanted fire are balanced. In the Prescribed Natural Fire Zone naturally-ignited fire is allowed to play its ecological role in the park.

Suppression Zone Description: Within the Suppression Zone, fire management activities will ensure the maximum protection for personal safety, property, and specific cultural resources. All fires that originate in or burn into this zone, despite their cause, will be immediately suppressed. Hazard fuel reduction may be undertaken by management-ignited prescribed fire and mechanical methods.

Area: This zone includes all major developed areas in the park. The zone around each area includes a one-half (0.5) mile buffer on the windward (southwest) side and a one-quarter (0.25) mile buffer in all other directions.

The developed areas encompass approximately 2,200 structures and 38 recreational sites. These developed areas include: Mammoth Hot Springs, Tower Junction, Lamar Ranger Station, Northeast Entrance, Norris, Madison, Canyon, Fishing Bridge, Lake, Old Faithful, Grant Village, South Entrance, East Entrance, West Entrance, and Bechler Ranger Station.

Conditional Zone Description: The cause of each fire that starts in the Conditional Zone will be determined in order to initiate the appropriate fire management response. This will ensure the protection of personal safety, property, and other specific cultural resources. Prescribed natural fires will be allowed to burn within predetermined prescriptions. Prescriptions will be more conservative than applied in the Prescribed Natural Fire Zone. Each prescribed natural fire will be monitored daily to ensure that it will remain within prescription. Any fire predicted to exceed prescription or that has exceeded prescription, will be declared a wildfire and the appropriate suppression response will be taken. Hazard fuel reduction may take place in this zone with the objective of reducing fuel accumulations, breaking up continuous fuels, and reducing the threat of unwanted fire. This may be accomplished by either mechanical or physical treatments or management-ignited prescribed fire.

Prescribed natural fires will be allowed to burn across agency boundaries in this zone if all provisions of the Greater Yellowstone Area Memorandum of Understanding are met (see Appendix E). The agency receiving the fire must have an approved and operational prescribed natural fire plan. A joint prescribed natural fire burn plan will be completed by all agencies involved. Decision criteria for daily revalidation of the burn plan (which will allow a fire to continue burning as a prescribed natural fire) will be signed by the appropriate line officers of each involved agency.

Area: The Conditional Zone includes the area from the park boundary to one and one-half (1.5) miles inside that boundary, including the Soda Butte drainage from its confluence with the Lamar River to the Northeast Entrance and the Middle Creek Fork drainage of the Shoshone River located inside the park's east boundary. Improvements located outside of major developed areas and included in this zone are: the smaller campgrounds, backcountry cabins, powerline corridor, picnic areas, and telephone installations. These improvements are generally located in isolated areas of the park and do not warrant the level of protection that the areas within the

Suppression Zone will receive. The goal is to protect these improvements but to not create greater resource damage by suppression actions.

Prescribed Natural Fire Zone Description: The Prescribed Natural Fire Zone includes areas within the park where naturally-ignited fires will be allowed to burn under predetermined prescriptions designed to perpetuate natural processes. The cause of all fires will be determined to ensure that they are naturally ignited; if not, appropriate management actions will be taken. All prescribed natural fires will be monitored daily and decisions revalidated to ensure that each fire will remain within prescription. A prescribed natural fire that exceeds prescription will be declared a wildfire and appropriate suppression action taken.

All human-caused fires originating within or burning into this zone will be declared wildfires and appropriate suppression action taken. Management-ignited prescribed fires may be used in this zone to meet management objectives of hazard fuel reduction around a smaller campground or a backcountry cabin.

Area: This zone encompasses the portion of the park inside the Conditional Zone, except for the designated developed areas which are part of the Suppression Zone. Improvements in this zone such as campgrounds adjacent to developed areas, backcountry cabins, the powerline corridor, picnic areas, telephone installations, and roads will receive special consideration when determining the appropriate fire management action.

Example 3-6

Operational Plan

Source: Bridger Wilderness Fire Management Plan. Bridger-Teton National Forest.

FIRE MANAGEMENT ZONES

The Bridger Wilderness has been divided into two fire management zones. These zones are based on recognizable fuels, predicted fire behavior, vegetation and landtype associations.

Zone 1 *(180,790* acres)

This zone, primarily above 10,000 feet, is underlain by the granite alpine glaciated landtype association. Zone I is bordered on the east by the Continental Divide, and consists of high elevation, rocky, low or non-vegetation areas that is broken only at Sweetwater Gap. The western boundary of Zone ll is marked by the break to more continuous tree cover. The entire area is dominated by high relief and extremely steep rocky slopes and feeder ridges with rock outcrops, talus, and scattered patches of shallow soils which support alpine grasses and forbs.

In recent fire history, there have been 15 fires in this zone that were suppressed. There were some additional indications that fire has occurred in several of the meadows, but these could have been related to early man's activity in the area.

Expected Fire Behavior

The area has such a low amount of vegetation that fires are extremely unlikely, except in the very small intrusions of denser vegetation or alpine meadows. Even if a fire does start, spread would be limited to the meadow by the vast expanse of rock and talus.

Most fires in this zone will go out before they are detected because of the low level of continuous fuel zone. The few fires that will have sufficient fuels to create detectable smoke will occur in the isolated spruce, subalpine fir, and whitebark pine stands. The fires occurring in the tree stands will normally burn for two to three days with some spotting possible as a result of torching.

With the exception of Sweetwater Gap, fires would not be expected to grow to a significant size and spread beyond the zone boundary. The Sweetwater drainage contains a north-south finger of open scattered spruce/fir and lodgepole. Given severe burning conditions, and subsequent long range spotting, the fire could spot north over the Continental Divide. This same area has some potential for a fire moving south into Zone ll.

Zone ll *(247,319 acres)*

This zone, primarily below 10,000 feet, consists of 8 landtype associations which vary from hummocky rolling slopes of glacial disposition to steep, complex-shaped slopes of high relief. Faulting, glaciation, and weak fluvial erosion have formed this zone of diverse vegetation on shallow to moderately deep soils. The landtype associations involved are the Sedimentary Alpine Glaciated (8,029 acres), High Elevation Mountain Slope (13,650 acres), Intermediate Mountain Slope (10,513 acres), Glacial Scoured (206,796 acres), Depositional Lands (454 acres), Lateral Moraine Lands, and Low Relief Moraine (10,840 acres).

The largest landtype association (Glacial Scoured) in the zone also supports the most diverse vegetation and fuel complexes in the wilderness. This part of the zone also has the highest fire occurrence rate, but due to the variations in fuels, fires though potentially large will not be continuous.
Even in many of the lodgepole stands, there is a large variation in ground fuels which will tend to retard ground fires and reduce torching or spotting success.

Expected Fire Behavior

Fire spread will be primarily on the ground due to low fuel loadings and patchy or sparse ground fuels. However, large fires are probable in this zone when active burning periods correlate with periods of wind. Since the fire will be burning in duff and other ground fuels for long periods of time, possibly for two to three months, it is probable that periods of favorable wind will occur with consequent increased rate of spread and potential for spotting.

While the zone's eastern boundary consists of sparse fuels on primarily glacial scoured landtype associations, the west side contains more productive soils and related higher fuel concentrations. Fire starts on these lower western slopes will tend to be larger and of higher intensity with fewer unburned islands than the high elevation and bench lands. Low elevation ignitions in this zone will move rapidly up slope with the right fuels, and often will be the origin for the largest fires. When slopes are oriented with the winds, increased fireline intensity, flame length, and rate of spread will occur. Spotting will be a major cause of rapid size increase and spread beyond natural barriers or fuel breaks, especially in drought years.

Most of the human-caused fires occur in this zone. With the exception of hunting season, the starts are concentrated along the main access trails and around the more popular campsites which are often located in the bottom or flats rather than on slopes or ridgetops. As a result, the human-caused fires are likely to be somewhat larger on an average than the lightning fires which originate higher on the slopes and ridges.

Because of past fires, it is probable that natural ignitions would be infrequent in drainage bottoms like those fires in the Beaver Park, New Fork, Green River Lakes, and Long Lake drainages. It appears that the Sweetwater drainage has entered a susceptible stage due to the increasing age of extensive lodgepole pine stands. In 1978, the Blair Creek Fire burned 1,016 acres immediately adjacent to the Sweetwater portion of the wilderness, followed by the Ann Fire in 1989 which burned 3,447 acres in the same drainage.

As indicated by the Fayette Fire, Boulder Canyon also presents what appears to be a situation similar to that of the New Fork/Pine Creek Canyon prior to the large fires there; it is likely that an ignition here could have much the same result under proper conditions.

The continuous and relatively uniform fuels along both sides of the western boundary provide the possibility for a fire to leave Zone ll. Under normal conditions, the fire would have to back downhill against the general south to southwest winds. It is possible under the right conditions, that a fire will move downhill and across the wilderness boundary.

Wilderness - An Enduring Resource

"A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain."

-Wilderness Act, 1964

On September 3, 1964, President Lyndon B. Johnson signed a bill creating the National Wilderness Preservation System (NWPS). This was the culmination of many years of hard work by conservationists and others concerned about the decrease of wildlands in a rapidly developing nation. This bill "secured for the American people of present and future generations the benefit of an enduring resource of wilderness."

The NWPS currently covers nearly 104 million acres, approximately 4 percent of the Nations land base and is managed by the Forest Service, Bureau of Land Mangement, National Park Service, and Fish and Wildlife Service.

The word "untrammeled" was used in the Wilderness Act to clearly convey that wilderness must be kept uncontrolled by humans. Wilderness management is not resource management in the traditional sense of doing something, manipulating, or improving any separate natural resource for maximizing a particular human benefit. It is preservation of the resource and experience for humans to use and enjoy as wilderness. This means allowing natural processes such as fire to play their ecological roles as much as possible. In wilderness our objective is to allow nature the freedom to perform the managing and manipulation of the vegetation and wildlife species.

In addition to the overall value of having an ecosystem that functions naturally with little or no human influence, wilderness also provides unlimited educational opportunities and an ecological benchmark for comparison with areas with more manipulative land mangement practices. Wilderness also serves as a haven for species diversity and preservation of gene pools. These are just a few of the many values that wilderness provides.

Goals & Objectives

An interdisciplinary team should be used to develop wilderness goals and objectives. This will help ensure that the objectives are comprehensive and not focused on a specific resource. For example, to have a wilderness objective that promotes a particular species or protects a historic cabin may be inappropriate if that objective stands alone. It is important that wilderness be managed as an entire resource--rather than maximizing any single resouce.

If “allowing lightning fires to play their natural role” is the goal, then one obtainable wilderness objective may be, “65 percent of all lightning ignitions will meet the criteria needed to be a prescribed natural fire (PNF).” This may be just one of many objectives managers create to achieve one goal. The objectives then lead to identification of obstacles and specific fire management strategies that can be used to overcome the obstacles. Using the above goal and example, one strategy may be, “to train additional PNF managers". Acceptable outcomes can be established. For example, 50 percent PNF’s may be considered acceptable, even though the objective was 65 percent. Managers can also measure success by using statistics to show how many PNF’s they actually managed over a 5-year period. This example is not intended to indicate that it is an acceptable or attainable goal in all areas of the country. It should be viewed merely as an example of how a resource goal can be written.

The same goal and objective could also lead to a very different fire management strategy than exemplified above. For example, if fuel loadings are heavy near the wilderness boundary and private land would be threatened by natural ignitions, then the fire management strategy to achieve the stated wilderness goal and objective, might be to have a management-ignition program to reduce the fuel loading along the wilderness boundary near the private land.

Nearly everyone agrees that a logical goal for a prescribed natural fire program is to permit lightning caused fires to more nearly play their natural ecological role within wilderness. However, some managers believe that due to complexities such as size of area, adjacent ownership, unnatural biomass accumulation due to past fire suppression, air quality pressures, among others, this objective, though desirable, may not be realistic. In these situations, management ignitions may be a desirable way to reestablish fire in ecosystems that are fire-dependent. However, before this decision is made, managers must address the appropriateness of management ignited fires in wilderness. The Wilderness Act describes wilderness as "an area where the earth and its community of life are untrammeled by man." Given this description, are management ignitions too manipulative? Or, is fire suppression just as, if not more, manipulative?

If the decision is made to have a management ignited fire program should there be an attempt to move toward a natural range of conditions for a fire regime? There are differing philosophies on this issue. One philosophy is that we reach back to some point in time prior to human interference, such as pre-European settlement in the East or Manifest Destiny in the West, and attempt to replicate the ecosystem of that period. But, perhaps these ecosystems were not really void of human interference. Another philosophy is that wilderness should be managed as wilderness from the date of designation forward and there shouldn't be an attempt to replicate a point in time.

These are the kinds of philosophical questions one must be prepared to discuss when defining goals and objectives. It's important that the interdisciplinary team working on wilderness fire planning is cautious about being too manipulative or controlling.

In the end, there won't be answers to these questions, or maybe even agreement. The important thing is to determine, to the extent possible, the natural range of conditions for a particular area and to allow fire to play a natural role within that range.

List of Examples - Wilderness Goals & Objectives

7. Wilderness Goals and Objectives. Libby Langston, Lolo National Forest.

E X A M P L E S

GOALS (BASED ON THE WILDERNESS ACT)	MEASURABLE WILDERNESS OBJECTIVES	OBSTACLES TO ACHIEVING OBJECTIVES	FIRE MGMT STRATEGIES TO ACHIEVE WILDERNESS OBJECTIVE	ACCEPTABLE OUTCOME (MEASURES OF SUCCESS)
"Which is protected and managed so as to preserve its natural conditions"		Not enough trained PNF monitors (fuel loadings are not heavy near wilderness boundary)	Train more PNFmanagers	Statistics indicate 85% of all lightning ignitions in the XYZ wilderness were managed as PNF's.
"Generally appears to have been affected primarily by the forces of nature"	Manage 95% of all lightning ignitions in the XYZ wilderness as PNF's	Heavy fuel loading inside wilderness boundary adjacent to private land	Use management-ignited fire to reduce fuel loading inside wilderness boundary near private land for future PNF program	Fuel loading reduced acceptable level with the 1/2 mile zone inside wilderness boundary near the private land. Stats indicate 85% of all lightning ignitions in the XYZ wilderness were managed as PNF's. No PNF's spread onto private land
"With the imprint of man's work substantially unnoticeable"	Implement and practice MIST in all situations unless firefighter safety would be jeopardized.	Feeling of immediacy and urgency during inital attack. Lack of trained firefighters in MIST	Train firefighters in MIST Evaluate urgency and situation thoroughly before any action is taken.	Most fire suppression efforts not noticeable by next field season.
"A primitive and unconfined type of recreation"	Opportunity to observe fire and natural succession	Lack of prescribed natural fires	Implement PNF program to the extent possible.	

Example3-7 (See pg. 3-43 for source)

E X A M P L E S

GOALS	MEASURABLE WILDERNESS OBJECTIVES	OBSTACLES TO ACHIEVING OBJECTIVES	FIRE MGMT STRATEGIES TO ACHIEVE WILDERNESS OBJECTIVE	ACCEPTABLE OUTCOME (MEASURES OF SUCCESS)
Allow lightning fires to play their natural role	Manage 75% of all lightning ignitions in the XYZ wilderness and PNF's	Not enough people trained and PNF managers	Train additional PNF managers to have more PNF's at one time. Increase PNF funding.	Statistics indicate 65% of all lightning ignitions in the XYZ wilderness were managed as PNF's
Allow lighting fires to play their natural role	Manage 75% of all lightning ignitions in the XYZ wilderness as PNF's	Heavy fuel loading inside wilderness boundary adjacent to private land with no buffer.	Use management-ignited fire to reduce fuel loading inside wilderness boundary near private land for future PNF program	Fuel loading reduced to acceptable level inside wilderness boundary adjacent to private land. Stats indicate 85% of all lightning ignitions in the XYZ wilderness were managed as PNF's. No PNF's spread onto private land.
To have natural landscapes (could have several wilderness objectives under this goal)	Restore natural, historical aspen component		To have stand replacing fires in mixed conifer types within a maximum allowable perimeter. (Units would individually decide on type of prescribed fire to be used)	Regeneration of aspen in burned area.

Prescribed Fire Qualifications & Skills

The Post-1988 Task Force stated, "It is not appropriate to assume that a person trained in suppressing wildfires is automatically qualified to manage a prescribed natural fire". Since 1988, all agencies have strengthened their requirements for personnel involved in a prescribed fire program. Most agencies now require that the skills and qualifications of wilderness fire managers be addressed at some level in the wilderness prescribed fire planning process. It is also helpful at this point to identify the number of qualified people who will be needed in each position to manage the total wilderness prescribed fire program for the particular park, refuge or district. This planning serves several purposes: 1) identifies training needs; 2) identifies opportunities for cross training with other units/agencies; 3) identifies unit limitations; 4) assists in risk analysis; and 5) establishes decision level for go/no go decision.

The examples in this section demonstrate how some units have addressed skills and qualifications. The complexity of a program will dictate how much detail is displayed. Individual agency guidelines should be followed at this time. Wilderness managers must be involved with fire managers in determining what specific skills and red card qualifications are needed for managing prescribed fire within a particular wilderness.

Having recognized the differences between suppression training and prescribed fire training, the National Wildfire Coordinating Group is proposing an interagency Prescribed Fire Qualifications and Training System. The system, if approved, will expand the existing prescribed burn courses used by the National Park Service, Bureau of Land Management and Forest Service. The system will be organized in the same format as suppression courses, with five elements established for each position: 1) experience, 2) qualifications, 3) required training, 4) suggested training, and 5) physical fitness. The proposed qualifications system is being reviewed by a few units in each agency. Final acceptance of the system may not occur until March 1995. While it is not appropriate to include these new positions in wilderness prescribed fire planning efforts at this time (unless already adopted by your specific agency), it may be wise to document current wilderness prescribed fire planning efforts in such a way that an adoption of the new prescribed fire qualifications system will not require a major revision. For example, provide general guidance and direction only in your programmatic level NEPA document and incorporate the specific qualifications by reference (to agency manual, etc.). Then, a change in agency policy or qualifications will not require public involvement and an amendment to your NEPA document.

List of Examples - Prescribed Fire Qualifications and Skills

8. Prescribed Natural Fire Management Qualifications. Alpine Lakes Wilderness Prescribed Natural Fire Management Action Plan, April 1993. Wenatchee and Mt. Baker/Snoqualmie National Forests.

9. Skills and Qualifications. Gospel-Hump Wilderness Prescribed Natural Fire Management Guidebook, 1993. Nez Perce National Forest.

Example 3-8

Prescribed Natural Fire Management Qualifications

Source: Alpine Lakes Wilderness Prescribed Natural Fire Management Action Plan, April 1993. Wenatchee and Mt. Baker-Snoqualmie National Forests.

There are two positions which are key to a safe and successful prescribed natural fire program. These are 1) **Prescribed Fire Manager** and 2) **Prescribed Fire Monitor.** There are a variety of other specialist that may be involved with the management of a prescribed natural fire, depending upon the scope and complexity, but these two position will be filled and dedicated to every prescribed natural fire.

TRAINING AND CERTIFICATION:

The responsibility for training and certification of Prescribed Fire Monitors will be at the district level. The appropriate line officer will ensure that minimum standards for this position are met prior to certification. The Prescribed Fire Manager will be certified by the Forest Supervisor. The Fire Qualification Review Committee (FSH 5109.17.22) will ensure that the minimum standards for this position are met after recommendation from the requesting District Ranger.

RESPONSIBILITIES:

PRESCRIBED FIRE MANAGER (FSM 5143.12) - The Prescribed Fire Manager is responsible directly to the Forest Supervisor, for implementation, coordination and on-going management of the assigned prescribed natural fire.

The Prescribed Fire Manager is responsible for:

1. Managing single or multiple prescribed natural fires.

2. Developing and implementing Prescribed Natural Fire Burn Plans.

3. Coordinating personnel and equipment requirements, including resources called in for holding and contingency action.

4. Monitoring prescribed natural fires to ensure all plan requirements are being met.

5. Recording and reporting cost and accomplishments and recommending improvements to the recommending District Ranger.

6. Daily revalidation of prescription criteria.

7. Ensuring safety of personnel.

The Prescribed Fire Manager may select a Prescribed Natural Fire Project Manager to supervise holding or contingency actions. This individual will at a minimum be Division/Group supervisor qualified.

PRESCRIBED FIRE MONITOR - The Prescribed Fire Monitor reports to the Prescribed Fire manager
The Prescribed Fire Monitor shall:

1. Observe, measure and document weather, fuels, fire behavior and smoke information on the appropriate forms.

2. Implement the Prescribed Natural Fire Monitoring Plan.

3. Communicate observations and information to the Prescribed Fire Manager as requested.

4. Prepare a narrative history or log of the assigned prescribed natural fire.

5. Input the collected data into the appropriate database for future evaluation.

6. Take photographs, slides and video tape of the project being monitored as requested.

QUALIFICATIONS:

Prescribed Fire Manager: This individual, must be a qualified Division/Group Supervisor. It is highly recommended that this individual successfully complete S-490 Advanced Fire Behavior.

Prescribed Fire Monitor: This individual must be a qualified Field Observer and should be a qualified Division/ Group Supervisor.

TRAINING NEEDS:

There is a recognized need to develop and maintain the skills and knowledge of personnel on both the Wenatchee and Mt. Baker-Snoqualmie National Forests in support of prescribed natural fire programs. Both Forests should develop cross-training programs for wilderness and fire management personnel and take advantage of any opportunity for on-the-job-training. This applies to prescribed natural fires, wildfires and prescribed (management ignited) fires. This is the only way to ensure that the prescribed natural fire programs, developed jointly by both Forests are fully successful.

Example 3-9

Skills and Qualifications

Source: Gospel-Hump Wilderness Prescribed Natural Fire Management Guidebook, 1993. Nez Perce National Forest.

At the Forest level, sufficient skills need to be maintained to direct and have backup capability to implement prescribed natural fire programs in the wildernesses, possibly simultaneously. Fire Behavior Analyst skills, in particular, need to be maintained so that some backup is available collectively on the Nez Perce National Forest. The Forest recognizes the need to have three fire behavior analysts to fully implement the prescribed natural fire program. The Forest Prescribed Natural Fire Coordinator (Nez Perce Fire Staff Officer) is responsible for tracking the overall program, coordinating training, and validating results. Designated PNF managers, as authorized by their respective line officers, will be responsible for carrying out operational elements of the program.

I. Personal Skills and Qualifications

Individuals involved in the decision making process, prescribed natural fire burn plan, and daily revalidation should have completed the following training, on-the-job experience or qualifications.

A. Line Officers (District Rangers and Forest Supervisors)

- Attend Fire Management for Line Officers
- Attend Prescribed Natural Fire Management
- Participate in one prescribed natural fire evaluation

B. Prescribed Fire Manager

- Attend Prescribed Natural Fire Management
- Knowledge and experience with wilderness resources
- Meet the standards identified in FSM 5144
- Knowledge and experience with Northern Rocky Mountain ecosystems
- Participate in one prescribed natural fire evaluation
- Be available throughout the duration of an active prescribed natural fire (RO Supp:5100-91-2)

C. Specialists

Depending on the fire situation and decision level, specialists that are likely to be consulted include:

- Wilderness Specialist
- Fire Behavior Analyst
- Public Information Officer
- Fire Operations Specialist (Division/Group Supervisor Qualified)
- Archaeologist
- Hydrologist
- Range Conservationist
- Soil Scientist
- Fisheries Biologist
- Research Natural Area Coordinator

In addition to their specific training in fields of expertise, these specialists should have the following training and experience:

- Familiarity with wilderness laws and philosophy
- Attend Prescribed Natural Fire Management or have participated in one prescribed natural fire evaluation
- Meet appropriate Regional qualification standards.

D. Tactical Team

Leader and appropriate team members are responsible for executing any necessary holding action. Qualifications and composition of the Tactical Team will be determined by the prescribed natural fire manager.

Funding Requirements

Having the necessary funding is a critical element to implementing a prescribed fire program in wilderness. Costs will vary from wilderness to wilderness. Some factors for determining costs are:

1. Identify possible support measures such as aerial reconnaissance, pack and stock animal needs.

2. Identify fire intensity levels in prescriptions, thus affecting holding forces.

3. Determine prescribed fire maximum allowable perimeter (m.a.p.).

4. Plan number and acres of prescribed fire over a period of time.

One effective means in trying to determine average annual funding needs is to identify costs per acre for confine and contain strategies on past fires that closely match your identified prescribed fire conditions, prescriptions, size, time of year, similar locations, etc.

All of the wilderness management agencies require that funding be available for prescribed natural fire before the "Go/No Go" decision is made. Any prescribed fire (natural or management ignited) must be financed by appropriate funds. If funds are not available the lightning ignition is a wildfire and the appropriate suppression response is paid out of wildfire suppression funds. A prescribed fire can be declared a wildfire, but the opposite cannot occur. The future of a national PNF program depends on managers within all agencies adherring to the specifics of funding for their particular agency.

Currently the Forest Service has no single method of establishing funding requirements for Wilderness Prescribed Fire. Normally, funds are designated from fire, wilderness, and wildlife management sources and pooled at the Regional or Forest level.

Examples in this section display a variety of funding requirement possibilities.

List of Examples - Funding Requirements

10. Funding Requirements. Eagle Cap Wilderness Fire Management Plan, July 1992. Wallowa-Whitman National Forest.

11. Carry-over funds for Prescribed Natural Fire. Gila National Forest.

12. Funding Requirements. Alpine Lakes Wilderness Prescribed Natural Fire Management Action Plan, April 1993. Wenatchee and Mt. Baker/Snoqualmie National Forests.

Example 3-10

Funding Requirements

Source: Eagle Cap Wilderness Fire Management Plan, July 1992. Wallowa-Whitman National Forest.

Funding of the Eagle Cap Wilderness (ECW) PNF Program includes four items: detection, PNF management, suppression, and funding sources.

Detection

The initial sighting of all wilderness fires will be financed with FFFP funds, the same as any other fire reported by a lookout or seen during routine fire detection flights. A determination must be made after detection whether the fire will be a prescribed fire or wildfire.

Managing PNF

Managing a PNF that is either inactive, small in size (for instance, less than 10 acres), or has a low probability of developing into a large fire, may only require occasional surveillance. It's anticipated that these fires can most efficiently be observed during routine wildfire detection flights. Managing a PNF having more active fire behavior (minor surface spread, some individual tree torching) will generally be conducted more frequently via aerial reconnaissance.

If on-site observations are required (as could be expected for large and/or very active prescribed fires), the entire cost would be charged to the Wilderness PNF Management Fund.

Fire Managers (FFFP) and Recreation (NFRN) personnel involved occasionally with PNF management activities will not charge their base hours to the Wilderness PNF Management Fund. However any overtime and/or per diem will be financed from this fund.

Any specialized equipment costs for managing PNF (helicopters, IR flights, film development, etc.) will be charged to the Wilderness PNF Management Fund.

Suppression

When prescription criteria are exceeded and the fire cannot be brought back into prescription with project funds, the fire will be declared a wildfire and appropriate suppression action will be taken. All activities, equipment, tools, and extra personnel needed to perform the appropriate suppression response will be financed as any wildfire suppression (FFFS) activity.

Funding Sources (Wilderness PNF Management Fund)

An account may be established at the Regional level to fund prescribed natural fires throughout the Pacific Northwest Region of the Forest Service. Use of these funds will be requested as needed, with priorities set for their distribution. If these funds are not available, it will be up to the Forest to provide funding through the Forest Wilderness PNF Management Fund. These funds may be held in a reserve account at the Supervisor's Office, or distributed to the District during the normal allocation process.

Normally, prescribed fires will be financed on a "first come, first served" basis. In the case of multiple starts, fires which best meet wilderness objectives should receive priority for funding as determined by the Forest Supervisor.

3 Examples

Objectives stated in FSM 2324.21 (Wilderness Fire Management), indicate both wilderness and fire management as appropriate sources to initially fund the wilderness PNF Management Fund. Ultimately this program should be multi-financed from the various functions receiving benefit, which are listed as objectives expected from a PNF Program.

Before any prescribed natural fire can be allowed to burn, there must be adequate funding available. When the available Wilderness PNF Management Fund has been committed to existing prescribed wilderness fires, subsequent ignitions will be ineligible for prescribed natural fire status. These new fires will be considered wildfires and the appropriate funding is FFFS.

Example 3-11 (See pg. 57 for source)

United States Department of Agriculture	Forest Service	Gila National Forest	2610 N. Silver St. Silver City, NM

Reply To: 5140/2300/6500

Date: July 26, 1993

Subject: Carry-over Funds for Prescribed Natural Fire Program

To: Regional Forester

An issue identified in this year's Program Development and Budget and Wilderness Fire Activity Reviews is our inability to manage an effective prescribed natural fire program under the current carryover rule. With the approval of our new wilderness Prescribed Natural Fire Plan and its new prescriptions, approximately 80,000 acres of this year's wildfires would have been Prescribed Natural Fires (PNF). During the 1992 season, about 40,000 wildfire acres would have fit the new prescriptions. In addition, the Forest is presently developing a PNF program for the remainder of the forest since our forest is comprised of fire dependent ecosystems.

One of the many criteria of a PNF plan requires that funding be available to administer it. The PNF program depends on nature with its many weather elements. Therefore, it is hard to determine in advance the size and/ or amount of a PNF program a unit might have from year to year.

Developing funding for our PNF program will be based upon our experience using the appropriate suppression response (contain and confine) strategies. These strategies are very much like what we will be required to do when we are administering a PNF. During 1992 we spent an estimated $23,000 on the 40,000 acres, and in 1993 an estimated $350,000 on the 80,000 acres. Presently, funding for the existing PNF program comes from both wilderness and fire.

During FY 92 under our old PNF plan, the Forest had established a 1900-4 for $20,000 and we only spent a small amount on the program. We lost $17,000 due to the 3% carryover rule. In FY 93 we put only $9,000 in the PNF 1900-4 - an amount equal to the 3% rule. Our 1993 PNF program under the old PNF plan is about to begin. Last year's acreage was 2,419. We do not know at this time if we will meet or exceed those acreages.

During FY 94 the Forest will be establishing a 1900-4 for $50,000 for our PNF program under the new PNF plan with its new prescriptions. Once our money is gone to administer the program, all prescribed natural fire will have to be declared wildfires and handled under the appropriate suppression response. We are asking for exemption of the 5% carryover rule for our prescribed natural fire program and only for the prescribed natural program. We see the funding for program working in this manner. Forests with a PNF program would be allowed to build up and carry over a maximum of $350,000. A suggested EBLI might be FPNF with an activity code PF26 and unit of measure in acres. The assigned target could be based on historical acres accomplished. When a District has a PNF, they would develop a burning plan and, within that plan, they would estimate how much money would be required for this individual PNF. Based on the burning plan and estimates, the Forest Supervisor would make the estimated allocation to the District for the project. As the PNF programs move outside of the wilderness, then other benefiting resources will also be providing funds to the program.

MAYNARD T. ROST
Forest Supervisor

Example 3-12

Funding Requirements

Source: Alpine Lakes Wilderness Prescribed Natural Fire Management Action Plan, April 1993. Wenatchee and Mt. Baker-Snoqualmie National Forests.

Before any prescribed natural fire will be managed as such, there must be adequate funds available to cover the anticipated cost. These cost estimates are developed in the resource needs section of the Prescribed Natural Fire Burn Plan. Once all available project funds have been committed to existing prescribed natural fires from both Regional and Forest accounts, ensuing ignitions will be considered wildfires and receive an appropriate suppression response.

The original detection of a wilderness fire will normally be through an observer flight on a routine detection patrol or a lookout. These are funded out of Emergency Fire Funds Suppression, (EFFS), accounts. After the fire has been determined to be a prescribed natural fire no EFFS money may be expended on it.

A. FUNDING PRIORITIES.

Under most circumstances, when there is a natural ignition in the wilderness, there are multiple ignitions. These are rarely all detected in one day. When this is the case, a determination must be made as to which start or starts will best meet wilderness management objectives. There should be priority given for funding as determined by the Forest Supervisor.

B. FUNDING NEEDS AND SOURCES

The annual amounts of funds needed to manage the Alpine Lakes Wilderness Prescribed Natural Fire program has been determined to be from $80,000 to $100,000. These funds will be held in a Regional account and distributed to the individual forest as needed, with priorities for distribution. If these funds are not available, it will be up to the Mt. Baker-Snoqualmie and the Wenatchee National Forests to provide funds from a Wilderness Prescribed Natural Fire Fund, a shared account.

C. EXPENDITURES

The level of management each PNF receives is determined in the Prescribed Natural Fire Burn Plan and is dependent on several variables. If it is determined that aerial reconnaissance is the most suitable management procedure, then management during a normal detection patrol is appropriate. If the flight is exclusively to manage a prescribed natural fire project, then project funds should be used.

The cost of any and all resources involved in the management of a prescribed natural fire project will be financed through project funds. This includes analysis, assessment, planning, holding actions, monitoring and evaluations. These resource needs and cost estimates are part of the Prescribed Natural Fire Burn Plan.

When the fire exceeds the prescription criteria, it will be declared a wildfire and appropriate suppression action will be taken. At that time all activities associated with the incident will be financed with EFFS funds.

Communications

Regardless of the agency involved or the size of a wilderness prescribed fire program, one of the critical elements for success of the program, is adequate public involvement. Ideally public involvement and public information will be woven into all levels of the planning and implementation process. Public involvement through scoping is required for analysis that will lead to a NEPA decision, but beyond that, support for a wilderness fire program can best be gathered with public involvement at the early stages of setting objectives and developing alternatives. The Yellowstone fires of 1988 emphasized this point.

Some portions of a wilderness fire inform and involve plan can be developed at the programmatic NEPA level. Other site specific actions will best be developed at the operational or implementation level.

In addition to the items contained in the examples that follow, other items that might need to be addressed in the inform and involve sections of wilderness fire documents are:

1. **Safety**

   evacuation plan

   plan for legal closures

   enforcement of public safety restrictions

2. **Inter/Intra Agency Coordination**

3. **Smoke Management**

Land managers of all agencies recognize the need to inform the public of the risks involved in prescribed fire management programs, but most efforts in this regard are still in their infancy. The Interior Fire Coordination Committee has formed a Fire and Education Initiative Committee to emphasize and address this need. Some States, such as Florida, have organized Prescribed Fire Councils with members from land management agencies, conservation groups, timber industry and research groups to promote prescribed fire and push the never ending task of public education. Local involvement with these types of groups can greatly assist a manager with the necessary public involvement on wilderness fire.

List of Examples - Communications

13. Inform and Involve Plan. Absaroka-Beartooth Wilderness Fire Management Guidebook, July 1993. Custer and Gallatin National Forests.

14. Inform and Involve Action Plan. Alpine Lakes Wilderness Prescribed Natural Fire Management Action Plan, April 1993. Wenatchee and Mt. Baker-Snoqualmie National Forests.

15. Inter/Intra Agency Coordination. Alpine Lakes Wilderness Prescribed Natural Fire Management Action Plan, April 1993. Wenatchee and Mt. Baker-Snoqualmie National Forests.

Example 3-13

Inform and Involve Plan

Source: Absaroka-Beartooth Wilderness Fire Management Guidebook, July 1993. Custer and Gallatin National Forests.

The Prescribed Natural Fire Inform and Involve program is crucial to gain the support and understanding necessary to re-establish and implement a successful program. The following categories will guide prescribed natural fire information dissemination and coordination in the Absaroka-Beartooth (A/B) Wilderness:

1. PNF Plan Review and Revision - These activities document the review process as directed by the Fire Management Policy Review Team.

11. Pre-Fire Season Information and Involvement - These activities prepare the wilderness complex for the upcoming fire season. Strategies to emphasize public awareness and education also occur here.

111. Prescribed Natural Fire and/or Wildfire Management - A specific Inform and Involve Plan is developed for each PNF and/or wildfire. This category of action involves current activity.

IV. Post-Season Activities - Information gathering and evaluation of the Prescribed Natural Fire Program. Activities consist of analyzing individual fire monitoring plans and programmatic monitoring data. Program results and interpretations should be disseminated to interested parties, other agencies, and within agency.

PNF PLAN REVIEW AND REVISION

TASK	TOOLS	RESPONSIBILITY	TIMING
Hire fire planning contractor to assist reviewing and revising the A/B Wilderness Prescribed Natural Fire Program.	Contractor	Fire Program Review Team	July, 1991
Line Officer Meeting at Big Timber RD to approve A/B Wilderness PNF Program review strategy.	In-house Meeting	Fire Program Review Team, District Rangers, & Forest Supervisors	July 16, 1991
Wilderness Fire Plan Charter approved, media releases and letter to public explaining PNF review process and why.	Charter, letter, & news release	Forest Supervisors & Fire Program Review Team	September 11, 1991
Period to receive comments from the media, public, and other interested parties.	Information letter and news release	Fire Program Review Team	September 12-November 15 1991
Analyze public comment, identify issues and concerns, and decide if further NEPA analysis is necessary.	In-house meetings	Fire Program Review Team	November 1991-January 1992
Forest Supervisors decide that original Prescribed Fire Program Environmental Assessment is adequate.	Letter	Forest Supervisors	April 28, 1992
Finish PNF Program Review and revise where necessary.	Guidelines	Fire Program Review Team, Line Officers, Resource Specialists, & District Personnel	May 1992-April 1993
Release Draft Book of A/B Wilderness Fire Management Guidelines to Federal, State, & Local Govt. Agencies. Conduct internal Forest Service review.	Guidelines Handbook	Fire Program Review Team and three A/B Wilderness Forests	April 1993

PNF PLAN REVIEW AND REVISION (CONTINUED)

TASK	TOOLS	RESPONSIBILITY	TIMING
Obtain Greater Yellowstone Area (GYA) Peer Review of Wilderness Fire Management Guidelines	Guidelines Handbook	GYA Peer Review Team	April-May 1993
Incorporate feedback into Final Guidelines Handbook. Present A/B Wilderness Fire Management Guidelines to Regional Office for approval.	Guidelines Handbook Executive Summary and Guidelines Handbook	Fire Program Review Team Fire Program Review Team and three A/B Wilderness Forests	May - June 1993 July 1993
Present approved A/B Wilderness Fire Management Guidelines to general wilderness users and permittees (outfitters).	Guidelines Handbook and Brochure	Three A/B Wilderness Forests	Summer 1993
Implement approved A/B Wilderness PNF Program after incorporation into each Forest's FMAP.	Guidelines Handbook and FMAP	Fire Management	June 1993
Develop news release that summarizes the updates or revisions to the A/B Wilderness PNF Program, and mail summary to interested publics.	News release and information letter	Fire Program Review Team and Public Information Officers	July 1993
Incorporate A/B Wilderness Fire Management Guidelines into the Shoshone NF LMP	Forest Plan Amendment	Shoshone NF	June 1994
Provide information on wilderness objectives, prescribed natural fire, and fire ecology to employees.	Meetings, brochures, videos and field trips	Forest Supervisors, District Rangers, Wilderness and Fire Management	On-going process
Provide information on wilderness objectives, prescribed natural fire, and fire ecology to government officials, the media, and the public.	Meetings, brochures, videos, field trips, news releases, and briefing papers	Forest Supervisors, District Rangers Wilderness and Fire Management	On-going process

PRE-FIRE SEASON INFORMATION AND INVOLVEMENT

TASK	TOOLS	RESPONSIBILITY	TIMING
Hold Dry-Run PNF ignition evaluation and decision scenario.	A/B Coordination Meeting	Forest Supervisors and District Rangers	Annually or Biannually by May
Put together pool of qualified individuals for positions in the A/B Wilderness & YNP PNF Programs	A/B Coordination Meeting & GYA FMO Meeting	Wilderness & Fire Managers	Annually by May each year
Prepare general wilderness/ fire management presentations for district employees.	Brochures, videos, & meetings	District Rangers, Wilderness and Fire Staff	Annually by June each year
Integrate wilderness fire management into annual wilderness and fire mgmt. training.	Meeting	Supervisor's Office and District Wilderness & Fire Staff	Annually by June each year
Provide information to outfitters, permittees, private in-holders, and general wilderness users potentially affected by prescribed natural fire.	Meetings, brochures, and videos	District Rangers	As needed
Integrate prescribed natural fire management into wilderness education presentations for 7th and 8th grade classes	Classroom Presentations	District Rangers	Annually
Prepare news releases on prescribed natural fire management in the A/B Wilderness.	News releases	District Rangers and PIO	Pre-fire season especially, but also during and post-fire season
Post wilderness fire management information at the trailheads.	Posters and signs	District Ranger	Annually by June each year

PRESCRIBED NATURAL FIRE AND/OR WILDFIRE MANAGEMENT

TASK	TOOLS	RESPONSIBILITY	TIMING
Keep appropriate Line Officers apprised of current and expected fire behavior.	Meetings, phone calls, and briefings associated with the Stage I, II, & III analysis and management	PNF Manager and Analysis Team	Ignition, fire duration, and when significant changes occur
Make news media aware of PNF and/or wildfire situation	Radio, Television and Newspapers	Forest Supervisor, District Ranger, PNF Manager, & PIO	Ignition, fire duration, and when significant changes occur
Post "Fire Caution" signs and information at wilderness portals.	Signs and posters	PNF Manager and District Ranger	PNF and/or Wildfire duration
Determine "weather conditions of concern" that would dictate a fire closure. Coordinate with adjacent units and other agencies.	On-site meteorological station, computer models, phonecalls meetings and field reconnaissance	Forest Supervisor, District Ranger, FBA and PNF Manager	Determined by current and expected fire behavior
Post "Fire Closure" signs and information at wilderness portals. Contact permittees (outfitters), general wilderness users, and private in-holders.	Phone calls, meetings, signs and posters	Forest Supervisor, District Ranger, PNF Manager, & PIO	When closure is put into effect
Keep appropriate National, Regional, and Local political contacts appraised of PNF and/or Wildfire status.	Phone calls, meetings, briefing papers, and news releases	Regional Office Forest Supervisor District Ranger, PNF Manager, & PIO	Based on National, Regional, and Local Fire Situation
Keep wilderness rangers, trail crews, and information receptionists appraised of fire status.	Phone calls and meetings	Forest Supervisor and District Ranger	PNF and/or Wildfire duration

POST-SEASON ACTIVITIES

TASK	TOOLS	RESPONSIBILITY	TIMING
Review information and education efforts involving prescribed natural fire.	Meetings	Forest Supervisors, District Rangers, & PIO's	Within three months of end of fire season
Evaluate and interpret post-fire monitoring and programmatic monitoring efforts & results.	Meetings	Forest Supervisors and District Rangers	Within three months of end of fire season
Report to the Regional Office PNF Record.	PNF Fire Record	Forest Supervisor	By the end of the fiscal year
Review Wilderness PNF Guidelines and Forest FMAPs to ascertain how they operated and were implemented during the past fire season.	Evaluation and Recommendation Report	Forest Supervisor	By the end of the calendar year
Contact general wilderness users, permittees (outfitters), and the public-at-large concerning this past seasons's fire activity.	Meetings, news releases, and phone calls	District Rangers and PIO's	By the end of the calendar year

Example 3-14

Inform and Involve Action Plan

Source: Alpine Lakes Wilderness Prescribed Natural Fire Management Action Plan, April 1993. Wenatchee and Mt. Baker-Snoqualmie National Forests.

In January, 1992, information package and response forms were sent to approximately 200 individuals, organizations, agencies and representatives of government at all level within the geographical area of the Alpine Lakes Wilderness. Those who received the information were determined through a compilation of names and addresses from the Wenatchee and Mt. Baker Snoqualmie National Forests public scoping mailing list.

By the February 27,1992 due date, only four responses had been received and they are on file in the Wenatchee National Forest Supervisors Office.

The following Inform and Involve Action Plan has been developed to ensure both the public and agency personnel are kept informed of the prescribed natural fire projects within the Alpine Lakes Wilderness. Agency and public action items are identified in one of four categories:

Fire planning and Revisions: These activities address fire plan revisions as well as general awareness of the prescribed natural fire program.

Pre-season Activities: These communication actions occur prior to the summer fire season to disseminate information to Wilderness users and agency personnel.

Prescribed Natural Fire or Wildfire in Progress: These activities keep the public, affected parties, and agency personnel informed.

Post-season Activities: Those actions planned for post-season information gathering and follow-up.

3 Examples

A. FIRE PLANNING AND REVISIONS:

Action Item	Responsibility	When
Notify the public of revisions.	Forest Supervisors of Plan	Upon revision of Plan
Notify Media	Forest Supervisors	Upon revision of Plan
Present Plan revisions to Districts/Forests	Forest Supervisors District Rangers	Upon revision of Plan
Increase understanding of wilderness objectives, prescribed natural fire and fire ecology.	Regional Office PAO's Forest Supervisors District Rangers	On-going

B. PRE-SEASON ACTIVITIES

Action Item	Responsibility	When
Present Wilderness fire policy and procedures to permanent/seasonal employees.	Staff Officers, District Ranger, Fire Management Officers	By field season each year
Maintain contact list of potentially affected outfitters, permittees, user groups, and landowners within and immediately adjacent to the boundary.	District Ranger	By May of each year
Prepare annual pre-season news article on wilderness fire policy and ecology.	Forest PAO's	By June of each year
Post "wilderness fire" information signs at appropriate trailheads.	Fire Management Officers	By field season each year

C. PRESCRIBED NATURAL FIRE AND/OR WILDFIRE IN PROGRESS

Action Item	Responsibility	When
Brief appropriate line officer(s) on current and expected fire status.	Prescribed Fire Managers	At fire start, then daily
Post "fire caution" signs at appropriate trailheads.	Fire Management Officers	When fire affects an area
Determine the need for a closure. Coordinate with affected and/or adjacent forests, agencies, landowners and permittees.	Regional Forester Forest Supervisors District Rangers	Determined by current and expected fire behavior

Action Item	Responsibility	When
Post "fire closure" signs at appropriate trailheads. Inform permittees, public and the media.	District Ranger	When closure is put into effect for an area, trail or road
Establish a public information organization to keep media informed of fire status.	Forest Supervisors District Rangers	Determined by current and expected fire status
Brief interested and affected parties (outfitters, permittees, and private land owners) on the fire status.	Forest Supervisors District Rangers	When a fire starts and a significant change occurs
Keep wilderness rangers, crews, and receptionists informed about fire status.	Forest Supervisors District Rangers	When the fire starts and a significant change occurs
Keep the media and public informed of the fires status.	Forest Superivsors District Rangers	When the fire starts and a significant change occurs
Document fire effects for future training courses and/or presentations	Prescribed Fire Managers Prescribed Fire Monitors	On-going

D. POST-SEASON ACTIVITIES

Action Item	Responsibility	When
Review past season's I & I effort	Forest PAO's, District Rangers	Yearly
Prepare news article summarizing the past season's fire activity	Forest PAO's	By November each year
Consider follow-up contacts with affected parties.	District Rangers	By February each year

Example 3-15

Inter/Intra Agency Coordination

Source: Alpine Lakes Wilderness Prescribed Natural Fire Management Action Plan, April 1993. Wenatchee and Mt. Baker-Snoqualmie National Forests.

In order for the Alpine Lakes Wilderness Area Prescribed Natural Fire Program to succeed there needs to be coherence in application and close coordination to establish professional credibility with local communities, forest users, other land management agencies and ourselves. Both inter and intra agency coordination and communication is essential to ensure a high level of credibility continues throughout the life of a Prescribed Natural Fire Project.

Inter and intra agency coordination will consist of two phases, 1) preseason planning and post-season evaluation, and 2) during a prescribed natural fire project.

Phase I will involve a pre-season review of the Prescribed Natural Fire Program at interagency meetings with:

Washington Department of Natural Resources
Local Fire Districts
Washington State Department of Ecology
US Fish and Wildlife Service
The Confederated Tribes of the Colville and Yakima Nations
Governors Office
Puget Sound Air Pollution Control

In addition, these entities will be kept informed during any on-going prescribed natural fire project.
Pre and post season review and evaluation should take place at:

Forest Management Team meetings
Forest Fire Management Officer meetings
Regional Fire Director and Staff meetings and Fire Manager's Conferences

Phase II involves on-going coordination while a prescribed natural fire is being managed. Coordination should occur with:

Puget Sound Interagency Coordination Center
Central Washington Interagency Communications Center
Pacific Northwest Interagency Coordinator Center

Refer to the Involve and Inform Action Plan for more specific information on prescribed natural fire coordination.

Risk Assessment/ Decision Analysis

For a prescribed natural fire program to be successful, decisionmakers must weigh the risks associated with having a program against those of NOT having one. If fires continue to be excluded by suppression, unnatural accumulations of biomass will occur, setting the stage for more catastrophic fires in the future. Another risk associated with suppressing fires is the potential loss of the unmodified environment and naturally functioning ecosystem. These are two keys points in the Wilderness Act.

Interior Department and Forest Service policy require prompt determination of the status of any ignition. This means that a new ignition needs to either be managed as a prescribed natural fire or declared a wildfire. When deciding whether an ignition should be declared a prescribed natural fire or a wildfire, understanding the risks involved in making each one of those decisions is essential.

Each decision should be documented in a flow chart such as the one in the example that follows this text. If the fire exceeds the prescription parameters, at any point in time, then the fire will immediately be declared a wildfire and appropriate action taken. The key is to do a thorough job of decision analysis/risk assessment during the initial 2-hour decision process.

Risk is based upon the lack of:

1. Control over the situation.
2. Information about the situation.
3. Time to deal with the situation.
4. Fiscal ability to handle a prescribed natural fire.

In order to reduce risk, one can have a greater sense of control over a situation if certain information is available. In a fire situation, managers need to know the fire history, existing fuel and weather conditions, long-range forecasts, drought severity, etc. in order to decrease the risk of a prescribed natural fire being designated a wildfire.

The more information managers have, the lower the risk of a fire behaving in an unexpected manner and going outside the pre-determined boundary. One of the most difficult factors in a prescribed fire program is predicting weather conditions for the life of the event. This factor becomes even more critical during period of drought and when there are multiple PNF's at the same time either locally or nationally.

When a prompt decision is required, the risk of making an ill advised decision is greater than when the decision-maker has more time to examine all the factors involved. This is the reason for having a 2-hour stage 1 decision process and then the 72-hour stage 2 decision process.

A good decision is one that is based on:

1. Clearly portrayed wilderness objectives of the decision-maker.
2. Clearly displayed knowledge of the risks and consequences associated with the different alternatives available.

List of Examples - Risk Assessment/Decision Analysis

16. Prescribed Natural Fire Decision Process. USFS, Northern Region, Missoula, Montana.

17. Risk Assessment Chart. Bob Marshall Wilderness Complex Guidebook on Prescribed Natural Fire, July 1990. Flathead, Lolo, and Lewis and Clark National Forests.

Example 3-16

Prescribed Natural Fire Decision Process

Source: USFS, Northern Region, Missoula, Montana.

Decision Phase

The following general decision process will be used by those Forests having a prescribed natural fire program in Region 1. It consists of two distinct stages. The first stage involves the use of a decision flow chart or matrix with key criteria that can be evaluated in less than 2 hours. This chart or matrix is contained in the Forest's Fire Management Action Plan. The second stage begins only after the first stage decision results in the further consideration of the ignition as a prescribed natural fire. It consists of completing a formal project level burn plan for the ignition. Follow the sequence below in the decision process of dealing with a natural ignition in an area approved for the use of prescribed natural fire.

The appropriate staff person evaluates the ignition against the applicable initial evaluation criteria as identified in the Fire Management Action Plan. These criteria facilitate making a timely decision on wildfire versus a recommendation on prescribed natural fire status. If the fire is clearly a wildfire, no delay in that determination is necessary and prompt initial action is expected. A recommendation to commence management of the ignition as a prescribed natural fire, if appropriate, is made to the line officer specified in the plan.

The initial decision is made by the line officer within the time frames established in the plan. In all cases this must be less than 2 hours. Make this decision carefully as it determines management's intentions until the burn plan can be completed. Document the decision. During each subsequent burning period that occurs between the first stage decision and the final completion and approval of the project burn plan, the approving officer reaffirms the ignition's prescribed fire status.

Concurrent with the first stage decision process, activate an analysis team to begin preparation of the Prescribed Natural Fire Burn Plan. The required elements of this plan are contained in FSM 5142.23 - Exhibit 01 is a sample format for a prescribed natural fire burn plan. Complete the second stage decision within the time frames established in the Fire Management Action Plan but in no case later than 72 hours after initial discovery.

When the burn plan is completed it is reviewed by the line officer. If the plan indicates an acceptable level of risk and consequences from the fire, the line officer may approve it. If the consequences and/or risk are unacceptable the line officer terminates prescribed fire status and commences the planned initial suppression action. If that fails, an escaped fire situation analysis is done to determine the appropriate suppression response to the wildfire.

Management Phase

The management phase of the fire covers those actions taken after the completion of both stages of the decision process and the ignition has been declared a prescribed natural fire. Once an ignition is declared a prescribed natural fire it is carefully monitored. The prescribed natural fire must be considered on an equal basis with ongoing wildfires in terms of making resource allocations for any needed holding actions if it is to be managed to a successful conclusion. Each fire has a prescribed fire manager assigned that is responsible to the appropriate line officer. A prescribed fire manager may handle more than one fire concurrently but should not be responsible for more than one significant prescribed natural fire (100+ acres) at any one time. If the fire's maximum allowable perimeter (MAP) covers more than one Forest or agency, each respective unit will approve the burn plan and agree to a mutually acceptable prescribed fire manager.

Example - Stage I DECISION FLOW CHART

Initial "Go/No Go" Decision Analysis
(To be completed within 2 hours)

Objective: Determine whether the fire meets preliminary criteria for Prescribed Natural Fire status.

1.	Is the Fire Human caused?	—->	Yes	—->	Appropriate Suppression
	No				
2.	Is there an immediate threat to life or property?	—->	Yes	—->	Appropriate Suppression
	No				
3.	Is there an immediate threat to the boundary?	—->	Yes	—->	Appropriate Suppression
	No				
4.	Funding Shortages for PNF's?	—->	Yes	—->	Appropriate Suppression
	No				
5.	Is risk of escape, as displayed by the Risk Assessment Charts, unacceptable to the appropriate line officer or does forecasted weather or predicted fire behavior preclude PNF designation	—->	Yes	—->	Appropriate Suppression
	No				
6.	Do national or regional preparedness levels preclude prescribed natural fire status (NIFC IV or R-1 V curtail new ignitions)?	—->	Yes	—->	Regional Office Approval Needed
	No				
7.	Are there other line officer issues that would preclude this ignition from being managed as a prescribed natural fire?	—->	Yes	—->	Appropriate Suppression
	No				
8.	Are there cumulative effects from other wildfires or nearby prescribed natural fire that would preclude an additional prescribed natural fire from being identified?	—->	Yes	—->	Appropriate Suppression
	No				
9.	Members of team unavailable or burn plan would take over 72 hours to prepare?	—->	Yes	—->	Appropriate Suppression
	No				
10.	Line Officer approval to proceed to Stage II Analysis and assignment of a prescribed fire manager.				

Approved: _____ _____
District Ranger Date

*Daily revalidation begins within 24 hours of the initial "go/No-Go" decision.
*Notify Dispatch Center of possible prescribed natural fire.
*If warranted, include rationale for decision.

Example - Stage II Decision Analysis

Secondary Decision Analysis
(To be completed within 72 Hours)

At this stage the line officer conducts a more thorough analysis of the risk and assumptions that formed the basis for the Stage I decision. More time is spent looking at social, political, legal, economic, and biological consequences associated with the long-term management or escape of the prescribed natural fire. Public safety needs to be thoroughly addressed in this stage. **The outcome of this process is the development of the prescribed burn plan.**

Objective: Determine whether the fire should remain a prescribed natural fire or be declared a wildfire. This analysis will allow the line officer to re-assess the Stage I Analysis.

A. Identify a Wilderness Fire Analysis Team composed of a prescribed fire manager and a wilderness manager, as a minimum, and any others needed to analyze the situation. The analysis should include the following:

1. Describe the forest and regional fire situation, including proximate fire activity, potential smoke effects, Energy Release Component, Severity Index, etc.
2. Describe the potential impacts of the prescribed natural fire to understanding the "decision level" of the fire. Two projections will be made: a) probable weather scenario, and b) severe weather scenario.
   - **a.** Information that could be considered in this process:
     - **(1)** Number of frontal passages expected.
     - **(2)** Number of days with temperatures, relative humidity, surface wind speeds that are conducive to rapid fire spread.
     - **(3)** Date of significant end of season precipitation.
   - **b.** A qualified fire behavior analyst will project the future growth of the fire based on the above information and formally document these projections. If complexity levels warrant, a fire behavior analysis will project the future growth of the fire based on the above information and formally document these projections. If complexity levels warrant, a fire behavior analysis group will project fire growth.
   - **c.** The Fire Behavior Analyst will provide the approving line officer with fire growth projections, the probabilities of occurrence, and confidence levels.
3. Develop the maximum allowable perimeter (MAP). It is important in this MAP development step that the manager's ability to maintain the fire within prescription parameters be considered equally with the desire to accomplish the wilderness management objectives. The MAP should not change through the duration of the incident. Subsequent ignitions within the MAP cannot be used to extend the MAP of the original ignitions, once it has been established. Additional starts within the existing MAP will be evaluated separately. The factors listed below will be used in the development of the maximum allowable perimeter.
   - **a.** The fire effects on the wilderness resource and its components.
   - **b.** The socio-political factors such as smoke dispersion and the effect on visitors.
   - **c.** The capability to manage a fire at the maximum allowable perimeter size.
   - **d.** This MAP should be located along defensible boundaries whenever feasible. Where defensible boundaries are not available on the entire perimeter, the holding plan will make specific recommendations as how the fire will be managed in those areas.

4. The line officer should compare the fire growth projections to the maximum allowable perimeter. The following guidelines are offered for consideration:
   - **a.** If the projections for the probable and severe weather conditions are within the MAP and adverse consequences are not forseen, then the risk of an escape is, at least initially relatively low. Daily revalidation will describe the means to evaluate risk as the burning season progresses.
   - **b.** If the fire would exceed the MAP under severe weather conditions, the Wilderness Fire Analysis Team must develop a decision tree that looks at the probability of success and associated benefits and the consequence of failure and expected losses. The line officer will use the risk assessment to decide whether or not to continue in prescription status. If the fire continues in prescribed status, the fire behavior analyst should develop periodic growth projections. These projections will form the basis of daily decision steps the line officer will have to evaluate.
   - **c.** If the normal and severe weather conditions exceed the maximum allowable perimeter, the risks inherent in maintaining prescription status may indicate that an immediate wildfire declaration be made.

Example 3-17

Risk Assessment Chart

Source: Bob Marshall Wilderness Complex Guidebook on Prescribed Natural Fire, July 1990. Flathead, Lolo, and Lewis and Clark National Forests

OUSEL

I. Weather Station: Firefighter

*Adjective Rating	6/1-6/15	6/16-30	7/1-7/15	7/16-7/31	8/1-8/15	8/16-8/31	9/1-9/15	9/16-9/30
Low								
Mod								
High								
Very High								
Extreme								

NORTH SPRUCE PARK

II. Weather Station: Firefighter

*Adjective Rating	6/1-6/15	6/16-30	7/1-7/15	7/16-7/31	8/1-8/15	8/16-8/31	9/1-9/15	9/16-9/30
Low								
Mod								
High								
Very High								
Extreme								

SOUTH SPRUCE PARK

III. Weather Station: Spotted Bear Mountain

*Adjective Rating	6/1-6/15	6/16-30	7/1-7/15	7/16-7/31	8/1-8/15	8/16-8/31	9/1-9/15	9/16-9/30
Low								
Mod								
High								
Very High								
Extreme								

Low Risk Moderate Risk High Risk

* If Keech-Bynum Index indicates significant long term drought conditions, use next higher severity rating.

Smoke Management & Air Quality

Smoke management is one of the most critical aspects of any wilderness prescribed fire program. The fire management activities of all federal agencies must comply with applicable federal, state, interstate, and local air pollution standards as specified by Section 118 of the Clean Air Act. It is not the primary intent of the Clean Air Act to manage impacts from natural sources (i.e. prescribed natural fires), but managers should consider the effects of smoke regardless of whether a prescribed fire is natural or management ignited. The following factors should be considered:

1. The immediate safety of personnel involved with the burn.

2. The health, safety, and property of those who may be directly affected by the fire.

3. The potential for off-site effects of smoke on public health and visibility.

Along with the Clean Air Act, most states also regulate open burning. This is defined as any fire from which the products of combustion are emitted into the atmosphere without passing through a stack or chimney. Several agencies may enforce rules for open burning, and several combinations of agencies may have jurisdiction. Federal, state, city, county agencies, and fire control and air quality management districts may be involved. The best source of information on smoke and air quality regulations can usually be obtained from the State Forester or Pollution Control Authority.

Although the regulations may vary greatly from state to state and thus from wilderness to wilderness, the process for conducting a smoke management program is fairly well defined by three basic objectives:

1. Identify and avoid smoke-sensitive areas.

2. Reduce emissions.

3. Disperse and dilute smoke before it reaches smoke sensitive areas.

It is important to realize that the full range of smoke management techniques may be available for management ignited fire in wilderness, but may not be available for prescribed natural fires or wildfires within wilderness. For example, emissions could be reduced in a management ignited fire by using only backing fire.

Assistance in preparing a smoke management plan and implementing smoke screenings can be found in individual agency manuals and handbooks. The publications, "Prescribed Fire Smoke Management Guide", produced by the Prescribed Fire Effects Working Team of The National Wildfire Coordinating Group (NWCG) and the "Prescribed Fire Plan Guide", also produced by NWCG; are good references which are interagency and national in scope. The document, "Best and Reasonably Available Control Measures for Prescribed Burning - EPA's Approach to Comply With Clean Air Acr Requirements", produced by the U.S. Environmental Protection Agency, details changes brought about by the 1990 amendments to the Clean Air Act. Regional supplements to manuals and handbooks with agency specific direction may also address the issue of smoke.

Several smoke management models are being used around the country. The most commonly used models are the Emissions Production Model (EPM) developed in the Pacific Northwest, the Simple Approach Smoke Estimation Model (SASEM), and the Tiered Smoke and Air Management System (TSARS). TSARS was developed by the BLM in Wyoming and links EPM and SASEM in an interactive operating environment.

In addition to the consideration of smoke being transported off site, the wilderness fire planning effort should consider the on site effects of smoke on the health of firefighters and prescribed fire personnel. A number of studies have been completed on this subject. Some of them are listed in the references section of this guidebook.

Although models and processes are available for predicting emissions and potential smoke-impacted areas, the key to a successful wilderness prescribed fire program may be education. Managers should emphasize public education in a thorough inform and involve plan. Trade-offs between the ecological need to burn and the impacts of smoke emissions should be included at the programmatic NEPA level. Displaying these effects during public involvement is essential. Site-specific effects and risks of smoke may be discussed at the implementation level. The following examples could be displayed at either planning level.

List of Examples - Smoke Management & Air Quality

18. Smoke and Air Quality. Teton Wilderness Fire Management Plan, April 1993. Bridger-Teton National Forest.

19. Air Resources. Alpine Lakes Wilderness Prescribed Natural Fire Management Action Plan, April 1993. Wenatchee and Mt. Baker-Snoqualmie National Forests.

20. Air Quality/Smoke Management Guidelines. Yellowstone National Park Wildland Fire Management Plan, April 1992.

Example 3-18

Smoke and Air Quality

Source: Teton Wilderness Fire Management Plan, April 1993. Bridger-Teton National Forest.

During the average fire season, unstable summer time air combined with prevailing southwest winds provides good smoke dispersal in the Wilderness. These conditions will push the smoke northeast towards the Washakie and North Absoraka Wilderness.

The town of Cody, and to a lesser degree Lovell and Greybull may be impacted by fires of any size burning in the Teton Wilderness. This was the case during the 1988 fire season.

Towns and recreation areas on the south and west side of the Wilderness are less likely to be affected by smoke, although night time inversions, especially during late summer and early fall would allow smoke to drain west and south down the major drainages towards Jackson Lake and the Buffalo Valley/Moran area.

The State of Wyoming, Department of Environmental Quality, Division of Air Quality (WDEQ/AQD), is the state agency responsible for establishing and monitoring air quality. The state standards for air quality meet or exceed federal air quality standards.

The 1989 Wyoming ambient standards for particulate matter less than 10 microns (PM-10) are:

> Less than 50 micrograms per cubic meter— annual arithmetical mean
>
> Less than 150 micrograms per cubic meter- 24 hour average concentration with not more than one exceedance per year.

The Total Suspended Particulate (TSP) standards are:

> Less than 150 micrograms per cubic meter— maximum 24 hour concentration not to be exceeded more than once per year.

Management ignited fires (prescribed burns) require prior approval from WDEQ/AQD. At this time, natural ignitions (and consequent prescribed natural fires) are considered natural events and are not subject to these requirements.

The state of Wyoming operates PM-10 monitors at Cody, Jackson and Sheridan. Normally, readings from these monitors are not available in "real time". It may be several weeks before the results are available.

During the 1988 fire season, the Wyoming Air Quality Division initiated accelerated air monitoring in the vicinity of the Greater Yellowstone Area wildfires. Two "Air Quality Alerts" were issued for parts of Wyoming based on the combination of intensified monitoring and predicted weather forecasts. Sites in Jackson and Sheridan surpassed the 24 hour TSP standards on two occasions, while the Cody site recorded 3 exceedances. These values were "flagged" by WDEQ/AQD. The values were not used in any air quality compliance/ noncompliance determinations because the high readings were caused by naturally occurring events.

Example 3-19

Air Resources

Source: Alpine Lakes Wilderness Prescribed Natural Fire Management Action Plan, April 1993. Wentachee and Mt. Baker-Snoqualmie National Forests.

The Clean Air Act (P.L. 95-95) classified certain wildernesses, including the Alpine Lakes Wilderness, as Class I areas, to be strictly protected from human-caused pollution (Ferry and others 1985). In addition the Clean Air Act requires all federal agencies to comply with federal, state and local air quality regulations (Haddow 1985). Smoke is recognized as an inherent part of many ecosystems and cannot be separated from ecosystems without some consequences, such as the disruption of the carbon cycle.

In implementing the State Implementation Program (SIP), the Washington State Department of Ecology has developed an Air Quality Program that established ambient air quality standards for several pollutants including particulate matter greater than 10 microns (PM I O) for four regions of the state. Included within these regions are the "non-attainment areas" or those areas that exceed national health standards for levels of one of six pollutants. While there is a chance emissions from a prescribed natural fire could effect air quality in some parts of Chelan, Kitittas and King Counties, it is highly unlikely a non-attainment area would be effected.

The Air Quality Program also established standards for visibility and monitors standard visual range from four sites in western Washington. Prescribed natural fire emissions could potentially affect visibility, especially within the Alpine Lakes Wilderness.

These effects will most likely be transitory in that intense smoke production events usually occur for a brief period of time. Assessment of smoke effects on wilderness visitors, off-site publics and air quality related values will be carefully considered in the daily evaluation decision making process of the Prescribed Natural Fire Burn Plan.

The effects of prescribed natural fires on regional air quality and visibility will be closely monitored and analyzed as plans are implemented. Individual prescribed natural fire projects will be managed to meet Class I AQRV goals and the appropriate requirements of the Washington State Implementation Plan (SIP). Additionally monitoring of Wilderness AQRVs will be an important part of evaluating Wilderness air quality and the Prescribed Natural Fire Program. A separate AQRV Monitoring Plan is being prepared for the Alpine Lakes Wilderness to facilitate this.

Example 3-20

Air Quality/Smoke Management Guidelines

Source: Yellowstone National Park Wildland Fire Management Plan, April 1992.

National Park Service fire management activities which result in the discharge of air pollutants (e.g., smoke, carbon monoxide, and other pollutants from fires) are subject to, and must comply with, all applicable federal, state, interstate, and local air pollution control requirements, as specified by Section 118 of the Clean Air Act, as amended (42 USC 7418). It is not the primary intent of the Clean Air Act to manage the impacts from natural sources of impairment (i.e., prescribed natural fires). Smoke from these fires is an inevitable by-product. Fires are not considered point sources of emissions, but tend to be spatially distributed singular events, and temporary impacts to visibility and visitor enjoyment must be recognized, expected, and managed. This may include temporary closures or warnings during the progress of management approved, ecologically essential fires. These fires are termed ecologically essential because fire plays a principle, and in some cases a dominant role, in maintaining the integrity of park resources.

Yellowstone National Park is designated as a Class I airshed under the Clean Air Act and is required to protect air quality values, including visibility. The Act requires the Environmental Protection Agency (EPA) and individual states to develop long-term strategies to achieve national visibility goals for Class I areas. Yellowstone is bound by this legal obligation to protect air quality and related values in the park from adverse effects. These effects are measured by six air pollutants: carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, ozone, and particulate matter.

The park monitors baseline visibility, particulates, sulfur oxides, nitrogen dioxide, total suspended particles, carbon monoxide, and ozone as well as meteorological conditions in the Lake and Mammoth areas. A transmisometer is located at Lake to monitor trends in visible air quality. A National Atmospheric Deposition Program site is located at the Tower Ranger Station.

Smoke from prescribed natural fires may impact visual opportunities. Smoke from these fires is part of the natural ecosystem and will be permitted under less-stringent application of the guidelines listed below. Smoke generated by management-ignited prescribed fires will be managed to minimize degradation of air quality and visibility. The park's guidelines for smoke from a management-ignited prescribed fire are:

1. All burn plans will have clear objectives and will monitor impacts of smoke on the human and natural environments.

2. Prescribed burns ignited in proximity to structures will only be ignited during periods of low visitation and if the prevailing winds will carry the smoke away from the structures.

3. Current and predicted weather forecasts will be utilized along with test fires to determine smoke dispersal.

4. Smoke dispersal will be visually monitored on a continuous basis at set intervals during the course of all prescribed burns. If air quality standards are exceeded or smoke creates a hazard or nuisance, especially in or near smoke sensitive areas, the prescribed burn will be extinguished.

5. An Air Quality Monitoring Plan will be developed and implemented for management-ignited prescribed fires larger than 100 acres and expected to last for more than three days.

6. When management-ignited prescribed fires are conducted, notification will include the states of Wyoming, Montana, and Idaho; the U.S. Forest Service; local communities that may experience smoke; park staff; park concessionaires; and park visitors.

All management-ignited prescribed fires will be approved and permitted as required by the Wyoming Department of Environmental Quality, Air Quality Division (WDEQ/AQD). Section 12 of Wyoming's air quality regulations prohibits activities that would violate the Wyoming Ambient Air Quality Standards for total suspended particulates. The U.S. Forest Service, Wyoming AQD, and the Bureau of Land Management have developed a computer model to estimate the possibility of a management-ignited prescribed fire exceeding air quality standards. Yellowstone will use this model, the Simple Approach Smoke Estimation Model (SASEM), to determine smoke impacts, amounts of smoke to be emitted, and potential locations that may be affected prior to igniting any fire. The state of Wyoming will evaluate this information and issue a burning permit if the emissions are determined to be within the acceptable parameters for maintaining air quality. No standards or restrictions regarding smoke emitted from prescribed natural fires have been set by the state of Wyoming.

Yellowstone has developed a Cooperative Smoke Management Plan with the state of Montana regarding smoke management and maintenance of air quality. This agreement establishes guidelines for management-ignited prescribed fires. As a signatory to this agreement, Yellowstone is granted an annual air quality permit. This permit requires Yellowstone to abide by the requirements and parameters established for conducting management-ignited prescribed fires. The park is also required to suppress fires if any of the parameters in the burn plan are being exceeded, or are predicted to be exceeded. No standards or restrictions regarding smoke emitted from prescribed natural fires have been set by the state of Montana.

Natural and Social Considerations

The scope and complexity of your wilderness fire planning effort will determine the range and number of natural and social considerations to be evaluated.

The checklist that follows offers natural and social factors that you may want to evaluate. Some of the items on the chart will not apply within wilderness but may need to be considered outside the wilderness boundary.

The items in the checklist can be used to help identify issues in the scoping process of the NEPA Analysis. After identifying which items on the list are pertinent to the particular analysis, the planning team can then decide which of the items require full evaluation in the NEPA document, and which can be considered in the scoping effort with no detailed analysis needed.

NATURAL AND SOCIAL CONSIDERATION CHECKLIST

PHYSICAL	BIOLOGICAL	SOCIO-ECONOMIC
1. _____Geologic Hazard	**1.** _____ Vegetation	**1.** _____Land uses
2. _____Climatic	a. _____Forest (includes diversity)	a. _____Roads
3. _____Soils	b. _____Rangeland management	b. _____Trails
a. _____Soil Productivity	c. _____T & E Plants	c. _____Electrical transmissions
b. _____Capability	d _____Other vegetation types	d._____Communication systems
c. _____Erodibility of soils	e _____Unique ecosystems	e. _____Rights-of-way
d _____Mass Failure	**2.** _____Wildlife	f. _____Land line
4. _____Minerals	a _____Wildlife Population	g. _____Private land inclusions
a. _____Locatable minerals	b._____Habitat	h. _____Air strips
b. _____Leasable minerals	c. _____T & E Species	i. _____Local residential
c._____Energy Sources	d. _____Diversity of animal	**2.** _____Economic base
5._____Visual Resource	communities	**3.** _____Recreational uses
6._____Cultural Resources	**3.** _____Fisheries	a. _____Outfitter guide services
a. _____Archeological resources	a._____Fish population	b._____Institutional uses
b. _____Historical resources	b. _____Habitat	**4.** _____Research use
c. _____Architectural resources	c. _____T & E Species	**5.** _____Administrative Use
7. _____Water		**6.** _____ Community Events
a. _____Water quality		**7.** _____Local Cultures
b. _____Streamflow regimes		**8.** _____Legal Considerations

(Natural and Social Consideration Checklist continued)

PHYSICAL

c. _____Flood plains

d. _____Wetlands

e. _____Ground water recharge

f. _____Water rights

8. _____Air Quality

a. _____Smoke Production

9. _____Noise

10.

a. _____Potential wildlife disturbance/harassment

b. _____Role of fire in ecosystem

11. Wild and Scenic Rivers

SOCIO-ECONOMIC

9. _____Firefighter/Public Health & Safety

10. _____Plans and programs of other agencies

Once you have used the checklist to identify natural and social considerations for further evaluation, you can look at developing protective guidelines and describing potential benefits. The remaining information in this section provides a formatted example for cultural resources and fisheries.

Natural or Social Considerations	**Protective Guidelines**	**Potential Benefits**	**Remarks**
Cultural Resources	*See Example #1 of this section	Prevent fire damage to identified historic cultural features	
Fisheries	*See Example #2 of this section	Reduce impacts on chinook salmon & water quality	

Development of protective guideleines and potential benefits will assist in establishing fire mangement units and fire prescriptions.

List of Examples - Natural and Social Considerations

21. Cultural Resources Protection Guidelines. Aldo Leopold and Gila Wilderness Prescribed Natural Fire Plan, June 1993. Gila National Forest.

22. Standards and Guidelines for Fire Suppression in Chinook Salmon Watersheds. Nez Perce National Forest.

Example 3-21

Cultural Resources Protection Guidelines

Source: Aldo Leopold and Gila Wilderness Prescribed Natural Fire Plan, June 1993. Gila National Forest.

The review of the Forest Service records for the Gila and Aldo Leopold Wildernesses indicate that there are 48 inventoried cultural resource sites that may be adversely affected by prescribed natural fire. Four of these sites are listed on the National Register of Historic Places: Mogollon Baldy Lookout Cabin, Reeds Peak Lookout, Black Mountain Cabin, and Hillsboro Peak Lookout and cabin. Two National Register sites are also present in the project area: White Creek Cabin and Apache Creek Cabin.

In addition, there are 36 known but unrecorded sites and sensitive areas that could be affected by prescribed natural fire. These are listed in Table 3.

It should be stressed that these are *known* sites that may be vulnerable to fire, and that less than 1% of the proposed fire management area has had survey coverage. Other sites may become known in the course of planning and monitoring a prescribed natural fire. Of special concern are wooden structures and features and rock art.

GUIDELINES:

1. CONSULT PNF PLAN. In the event of a designated prescribed natural fire, the Burn Manager will consult the PNF Plan for a listing of cultural resource sites that could occur within or adjacent to the allowable burn area. Site lists will be updated as necessary.

2. WHEN TO CONTACT ARCHAEOLOGIST. If known cultural resource sites are located within or adjacent to the allowable burn area, contact the forest or district archaeologist to help determine protection strategy.

3. BURN PLAN. PNF burn plans will identify cultural resource sites within and adjacent to allowable burn areas. Potential tactics that could be used to protect sites include: burnout and backing fires to produce a safe black line around a site, use of trails and natural features to herd or shift the fire away from sites, helitack rappellers, water and bucket drops, scratch lines, and possible wet line and foam applications.

4. BURN PERSONNEL. Assure that burn personnel are briefed on the strategy and specific techniques to be used to protect cultural resources.

5. ESCAPED FIRE. Should the fire leave prescription and become a wildfire, an appropriate response strategy will be applied. Contact the Forest Archeologist to help develop a response strategy when cultural resources are threatened.

6. HISTORIC MINING ZONE (TABLE 3, ITEM 35). This sensitive area lies along the western edge of the Gila Wilderness, between the mining town of Mogollon, on the north end, and Seventy Four Mountain, on the south. It overlaps the wilderness boundary into the adjacent Glenwood Prescribed Natural Fire Management area to the west. In order to protect these fire sensitive sites until an inventory is completed, the following guidelines will apply:

   Within the Historic Mining Zone no Prescribed Natural Fire will be permitted until further cultural resource inventory has been conducted.

7. ROCK ART SITES. Rock art sites typically occur in settings (rock outcrops) where fuel levels and continuity are low and broken. The potential for damage to such sites is therefore low. However, some sites may require protective measures. The protective needs of a given area will be determined on a case by case basis by the District, Zone, or Forest Archaeologist in consultation with the Burn Manager. Any rock art sites determined to be in danger because of high fuel levels will be protected using methods described in Item 3.

8. FUTURE INVENTORY AND EVALUATION.

(a). Over the next five years, the Forest will schedule evaluations of all sites susceptible to fire damage (include in Gila Wilderness Implementation Schedule).

(b). Over the next five years, the forest will inventory the historic mining zone (include in Wilderness Implementation Schedule).

9. FOLLOW-UP STUDIES. The Gila National Forest is currently lacking information regarding the effects of fire and fire fighting procedures on cultural resources within its jurisdiction. The activities proposed in the fire management plan offer an opportunity to study such effects for better management of the resources in the future. It is therefore recommended that follow-up studies involving current archaeological survey and testing techniques, along with quantitative analysis of the results, be included in post fire treatments.

10. NOTE: These guidelines only apply to Prescribed Natural Fire treatments. Management ignited fires and post-fire rehabilitation treatments involving ground disturbing activities will require separate consultation and may, depending on previous survey coverage of a given area, require archaeological inventory.

Example 3-22

Standards and Guidelines for Fire Suppression in Chinook Salmon Watersheds

Source: Nez Perce National Forest.

These standards and guidelines are meant to reduce the impacts of fire suppression on chinook salmon and water quality. They should be considered when fighting fire in any drainage, but are especially important in areas where chinook are known to occur. Fire dispatch offices should have maps which display chinook salmon distributions.

Every effort should be made to minimize stream course disturbance, sedimentation, and actions which could result in increased water temperatures. Consider these potentially adverse fire suppression effects, and the potentially adverse effects of wildfire damage, during initial fire size-up, initial suppression response, and in the development of EFSA's.

Concerns	Standards & Guidelines
1. Fireline	a Size and location consistent with Minimum Impact Suppression Tactics (MIST). b Rehabilitate all mechanized line. (e.g. seed, drain, obliterate, etc.) c. Construct erosion control structures as handline is built. d. Avoid using stream bottom as improved or constructed control point. If needed, consult with resource advisor to minimize impacts. e. In burnout operations, minimize fire intensity near streams.
2. Introduction of toxics	**Notify Forest Dispatcher in the event of any significant spill**
A. Retardant, foams, and surfactants	a. Avoid application near live streams or lakes (200'), and use special care in mapped areas. b. Do not pump directly from streams if chemical products are to be injected into the system. If chemicals are utilized, pump from a fold-a-tank located at least 200' from water. c. Avoid backflushing pumps and charged hose into live streams and lakes.
B. Fuel spills	a. Keep fuels at least 200 feet from stream, lakes and riparian areas. b. Do not use riparian areas (200' from live water) for helibases or refueling operations. c. Provide for spill prevention and containment measures for extended operations.
3. Camp Location	a. Avoid mapped areas, and use only those approved by Resource Advisor. b. No camp locations near identified spawning areas.
4. Water intake direct effects	a. Water chances should be located and designed so as to minimize direct impacts on chinook salmon. Avoid when possible spawning areas and juvenile rearing waters. b. Helicopter bucket dipping from streams in or adjacent to spawning concentrations should be avoided. c. Helicopter bucket dipping should be done only after chemical injection systems have been removed, disconnected, or rinsed clean.
5. Lack of awareness	a. Participation or consultation with a fisheries biologist is considered essential in the development of an EFSA in areas where chinook salmon may be present. b. Provide complete briefing and maps to overhead teams and crews involved in areas where chinook salmon are known to exist.

c. A Biologist/Resource Advisor should be readily available to the Incident Commander, and participate in shift plan development to assess the potential effects of planned actions.

d. After the fire is declared out, a Biologist should review suppression and rehab actions to see if tactics and mitigation measures identified in the EFSA were appropriate and successfully implemented.

Drought Assessment

A critical component to consider in the planning process for prescribed natural and management ignited fires is the use of a systematic method of estimating drought. One of the concerns from the 1988 fire season, was that managers had failed to recognize the influence of drought on conditions. Drought is key to natural fire regimes as well as to risk and fire behavior. Critical fire events occur during extended drought in many fire regimes. Managers must seek ways to meet the challenge of prescribed fire in wilderness during periods of drought.

The most commonly used indicators of drought are the Palmer Drought Index (PDI) and the Keetch-Byram Drought Index (KBDI). Both were developed by John Keetch and George Byram, and originally were developed as aids for agriculture. The PDI is used extensively throughout the western states, but is not as applicable in the east. KBDI is used extensively in the eastern states and also in some parts of the west.

In addition to these two drought indices, Energy Release Component (ERC) and 1000-hour fuel moisture have been used in some parts of the country. Care must be used in selecting a drought indicator. For example, 1000-hour fuel moisture is a poor indicator in the southeast. The high relative humidity recovery experienced during most summer nights in the southeast tends to cause the 1000-hour fuel moisture to bottom out at a level that is not really indicative of the drought conditions present.

Other Scientific Data

In addition to fire history, fire frequency, drought, and the other elements that describe a fire regime are generally included. Some wilderness prescribed fire planners may need to display additional background information to support the decision rationale and to fully explain the risks of the program. Other items that may be useful are:

Energy Release Component

Fire Intensity

Lightning Occurrence Data

Normal Weather Patterns

METAFIRE Severity Predictions

Haines Index (a severity predictor)

Fuel loading data

Fuel changes over time

List of Examples - Drought Assessment

23. Drought Assessment. Bob Marshall Wilderness Complex Guidebook on Prescribed Natural Fire, July 1990. Flathead, Lolo, and Lewis and Clark National Forests.

Example 3-23

Drought Assessment

Source: Bob Marshall Wilderness Complex Guidebook on Prescribed Natural Fire, July 1990. Flathead, Lolo, and Lewis and Clark National Forests.

The need for a systematic method of estimating drought has been identified as a critical component in the prescribed natural fire planning process. Several methods of assessing drought are available and can provide the Prescribed Natural Fire Manager with appropriate information upon which fire management decisions can be based. The Keech-Byrum Drought Index has been selected to aid the managers of the Bob Marshall Wilderness Complex in the assessment of drought conditions. This method was selected because it can be developed from site specific information available to the manager via the Snotel system maintained by the USDA Soil Conservation Service.

John Keetch and George Byram emphasized that their drought index "is not in any way a substitute for the moisture parameters used in the spread phase of the National Fire Danger Rating System. A drought condition is not the prerequisite for the occurrence and spread of fire in any area. The drought index does not replace the buildup index (ERC), because it represents an entirely different moisture regime in which the response to weather changes is much slower than with the buildup index. The purpose of the drought index is to provide fire control managers with a continuous scale of reference for estimating deep-drying conditions in areas where such information may be useful in planning fire control operations."

The Keetch-Byram Drought Index expresses drought as an index on a scale ranging from O to 800. Zero is the point of no moisture deficiency and 800 is the maximum drought that is possible. The available range of drought has been divided into stages. The zero or incipient stage includes the range from O to 99, the first stage from 100 to 199, and so on through the seventh stage from 700 to 800.

The attached graph provides an indication of the drought severity for the years 1983 (a wet, non-eventful fire season), 1985 (an active early fire season), and 1988 (a severe extended drought fire season). Comparisons of these charts with current drought readings will provide the Prescribed Fire Manager with a tool to interpret the severity of drought conditions.

Fuel Treatment for Hazard Reduction

There may be a need to reduce hazard fuels to increase the opportunities for prescribed natural fires. The objectives of any fuel treatment measures would be directed toward protecting private property or administrative sites and facilities, or to lessen the probability of a fire escaping the wilderness. Fuel treatment measures that may be used to reduce the risk to these protected areas include:

1. Planned ignitions and/or mechanical fuel manipulation outside the wilderness boundary.

2. Planned ignitions inside the wilderness boundary where wilderness management objectives and conditions are met.

3. Non-mechanical fuel manipulations or planned ignitions to reduce the risk in close proximity of identified administrative facilities and/or private property within the wilderness.

The objective of these actions is to increase the probability of success of the program and reduce the threat of escape from the area or significant damage to capital investments. These actions should be planned and scheduled prior to a prescribed natural fire.

The most practical method of modifying the fuel characteristics adjacent to the wilderness boundary is to carefully incorporate the needs of prescribed natural fire in other vegetation management projects. Proper road location, unit layout, hazard reduction, and silviculture prescriptions can all contribute to a modification of existing fuel loads, and reduce the risk to resources outside the wilderness.

When protecting individual sites or facilities, other alternatives are available. Aside from physically modifying the fuels around the sites, some may be more appropriately protected by the use of heat reflective coverings and/or judicious use of foams, sprinkler systems and pumps or gravity socks. These techniques have been proven to be very effective in protecting certain sites under low to moderate risk situations.

Avoid techniques that put people at risk.

Areas that need protection along with a discussion of the best protection techniques should be included in your planning document.

List of Examples - Fuel Treatment for Hazard Reduction

24. Identification of Fuel Treatment Measures. Prescribed Natural Fire in the Selway-Bitterroot Wilderness, May, 1990. Bitterroot, Lolo, Nez Perce, and Clearwater National Forests.

25. Consideration for Fire Management Guidelines. Anaconda-Pintler Wilderness Fire Management Guidelines, April 1993. Beaverhead, Bitterroot, and Deerlodge National Forests.

Example 3-24

Identification of Fuel Treatment Measures

Source: Prescribed Natural Fire in the Selway-Bitterroot Wilderness, May 1990. Bitterroot, Lolo, Nez Perce, and Clearwater National Forests.

The intent of any applied fuel treatment measures for the Selway-Bitterroot Wilderness would have the explicit objective of protecting identified private property, administrative sites/facilities and those perimeter areas that are susceptible to having a fire escape across the Selway-Bitterroot Wilderness boundary. Acceptable methods of fuel treatment that may be used to reduce the risk to these protected areas have been addressed in the original Selway-Bitterroot Wilderness fire policy change EIS and include:

* Use of planned ignitions and/or mechanical fuel manipulations outside of wilderness boundaries.

* Use of planned ignitions inside boundaries **where those** ignitions **are part of** holding and/or contingency plans contained within each prescribed natural fire burn plan.

It is intended that the first method be planned and scheduled prior to a prescribed natural fire event. The objective of both methods are to increase the probability of the success of the program and substantially reduce the threat of escape from the area or significant damage to private property, administrative sites/facilities and other investments.

Two of the alternatives in the EIS (Fire Management in the Selway-Bitterroot Wilderness - Proposed Policy Change) approved in 1976 specifically addressed the use of planned ignitions (management ignited prescribed fires) in section V. However neither of those two alternatives was selected. Those alternatives read:

Alternative B (Page 82): Restore fire to the Selway-Bitterroot ecosystems by use of prescribed burning rather than depend on natural ignitions as proposed.

Alternative D (Page 85): Restore fire in the Selway-Bitterroot ecosystems through use of fire started by natural ignitions, as proposed, and *limited* application of prescribed burning.

Neither of these alternatives were selected for reasons stated under each alternative in the EIS. Because of this, use of planned ignitions within the Selway-Bitterroot Wilderness will not be considered at this time. Page 88 of the EIS shows a comparison of the proposal to all of the other alternatives.

Perimeter Areas

Key perimeter areas that are susceptible to a fire crossing from inside the wilderness to outside must be identified. Topography, fuels characteristics and historical records need to be evaluated by fire behavior and fuel management experts to determine where these vulnerable areas are located. The degree of vulnerability of these perimeter areas should also be determined on the basis of potential risk of escape. Prioritization for dealing with these areas should be based on this assessment of risk probability. Some logical preventative measures are to modify the fuels characteristics within these areas to increase the probability of suppression actions being successful or to exclude the vulnerable areas by modifying the prescribed natural fire management unit boundary so that it is located in a more defensible location. This boundary could move either inside or outside the wilderness. Actions planned to suppress a wildfire that threatens these vulnerable areas should be thought out. Those responsible for development of the individual prescribed natural fire burn plan must be careful to exclude these identified vulnerable perimeters during the determination of the maximum allowable perimeter.

Individual Site/Facility Protection

When protecting individual sites or facilities, other alternatives become available during the holding and contingency plan operations. Along with the possibility of physically modifying the fuels around these sites, some may be more appropriately protected by the use of heat reflective coverings and/or the judicious use of foams, sprinkler systems and pumps. These techniques have proven to be very effective measures in protecting certain sites under low to moderate risk situations.

All sites or facilities need to be identified by each Forest. Information about these areas needs to be shared between Forests, especially those areas close to Forest boundaries.

Responsibility

It is the responsibility of each Forest's wilderness manager to identify and prioritize the areas that need to be protected or modified within the wilderness. Together with the fire management staff, the wilderness managers will decide and schedule identified treatments needed along the wilderness boundaries. Some of these treatments will also need to be coordinated with other functional areas on the Districts and Forest.

The fire management staff will assist in these endeavors where fire behavior expertise is required and will have the responsibility to implement any plans developed, especially with regard to use of planned ignitions. Funding for treatments should be multi-functionally based.

Example 3-25

Consideration for Fire Management Guidelines

Source: Anaconda-Pintler Wilderness Fire Management Guidelines, April 1993. Beaverhead, Bitterroot, and Deerlodge National Forests.

DECISION PROCESS

B. PROTECTION CONSIDERATIONS (FSM 5142.21 #8)

The intent of any applied fuel treatment measures would have the explicit objective of protecting identified private property, facilities and those perimeter areas that are susceptible to a fire crossing them. Acceptable methods of fuel treatment that may be used to reduce the risk to these protected areas include:

1. Planned ignition and/or mechanical fuel manipulations outside of wilderness boundaries.

2. Planned ignitions inside boundaries where there is no feasible alternative to treat outside the wilderness boundary.

It is intended that these actions be planned and scheduled prior to a prescribed natural fire event. The objective of these actions is to increase the probability of success of the program and substantially reduce the threat of escape from the area or significant damage to capital investments.

Key perimeter areas that are susceptible to a fire crossing from inside the wilderness to outside must be identified. Topography, fuels characteristics and historical records need to be evaluated by fire behavior and fuel management experts to determine where these vulnerable areas are located. The degree of vulnerability of these perimeter areas should also be determined on the basis of potential risk of escape. Examples may range from "no chance to defend" to "1 in 1000 chance of fire escaping". Prioritization for dealing with these areas should be based on this assessment of risk probability. Some logical preventative measures are to modify the fuels characteristics within these areas to increase the probability of suppression actions being successful or to exclude the vulnerable areas by modifying the prescribed natural fire management unit boundary so that it is located in a more defensible location. This boundary could move either inside or outside the wilderness.

Actions planned to suppress a wildfire that threatens these vulnerable areas should be thought out. Those responsible for development of the individual prescribed natural fire burn plan must be careful to exclude these identified vulnerable perimeters during the determination of the maximum allowable perimeter.

When protecting individual sites or facilities, other alternatives become available. Along with the possibility of physically modifying the fuels around these sites, some may be more appropriately protected by the use of heat reflective coverings and/or the judicious use of foams, sprinkler systems and pumps. These techniques have proven to be very effective measures in protecting certain sites under low to moderate risk situations.

It is the responsibility of the wilderness coordinator to identify, prioritize and schedule treatments for the areas that need to be protected or modified. The fire management staff will assist in this endeavor where fire behavior expertise is required and will have the responsibility of implementing any plans so developed. Funding for treatments should be multi-functionally based.

3 Examples

Specific protection considerations in the Anaconda Pintler include the following:

WISDOM R.D.

1. Mystic Cabin

Location: T1N, R16W, Sec 2, Elevation 7900', Mystic Lake

The long term objective for Mystic Cabin is to maintain it in a fashion that allows for its use by Forest Service employees on official business, protects it from deterioration, and presents the image of a building actively maintained and cared for by the Forest Service. Maintenance and rehabilitation will be done in a fashion that meets the standards of management for a historic structure eligible for listing under the National Register of Historic Places.

Fire prevention activities, such as cutting overhanging limbs and removing debris from the cabin roof, will be conducted as needed to prevent human caused fires.

No fuels management will be employed in the vicinity of the cabin for the purpose of defending the cabin in the event of a wildfire or prescribed natural fire. If a fire threatens the cabin, no protection or suppression measures will be made to save the structure.

At the same time, no measures will be taken to direct a fire at the cabin. Fire management or fire suppression activities should be conducted as if no structure existed at the site. The cabin has been in place for 60 years and has not been impacted by fire. Wet ground conditions, the lake, streams, trails and bare ground make the site somewhat immune to ground fire.

2. Bender Cabin

Location: T1N R17W Sec 28, Elevation: 8,000'

If it is incorporated into the Anaconda Pintler Wilderness the Bender Cabin will be managed in the same fashion as Mystic Cabin. Until this designation, the Bender Cabin will be protected by standard fire suppression techniques in the event of a fire. Presuppression vegetation manipulation around the cabin should be avoided to maintain the wilderness character of the area for future Wilderness designation.

If either structure burns, the site may be cleared of debris leaving unburned remnants of structures such as foundations, chimneys or charred logs.

PHILIPSBURG R.D.

1.Clipper Lode Mine, Survey # 10579, Mineral Entry # 073448 (Weaver's Patented Mining Claim and Cabin).

Location: Twenty acres at the head end of Copper Creek, T2N, R16W, SE1/4 SEC 3. Elevation: 7800'.

Fires which threaten this land or cabin will be suppressed.

Philipsburg District Ranger discussed the protection needs in the vicinity of this claim with owner, Jim Weaver. Mr. Weaver is aware of prescribed natural fire policy. He does not want fuel breaks created as advance protection

measures along the borders of the claim, nor does he have a problem with "a corner" of the claim burning. He **does** want the cabin protected.

The claim lies at the top of the Copper Creek drainage near forest service Trail #26. The drainage is heavily timbered. The area around the claim is primarily old growth spruce and sub-alpine fir. This north aspect tends to be damp with numerous seeps. The clearing which surrounds the cabin would not carry fire readily. The one room cabin is made of dimension timber, milled on site. It has a steel roof. There is a creek nearby which could provide a pump chance.

2. Patented Mining Claim

Location: Approximately 20 acres, T4N, R14W, Sec 28 Elevation: 8200'

This claim has no structures and has had no activity for years. It is near the top of peak 8285. Area is primarily rock. Likelihood of fire is very small; however, private land is under State protection and fires will be suppressed.

3. 640 Acre Inholding, near Storm Lake

Section above Storm Lake, T4N, R13W, Sec 31. This entire section is in private ownership, R-Y Timber. A land exchange process has been initiated. Fires which threaten this land will be suppressed.

4. North of Continental Divide T4N, R13W, Sec 32 & 33 fall under State protection and fires will be suppressed.

5. Bridges and Puncheons

The Philipsburg District has numerous trail bridges and puncheons which would be very costly to replace if they were destroyed by fire. Protection of these structures with gravity sock sprinklers, fire shelters and other minimum impact strategies would be appropriate. Major vegetation modification measures should not be taken.

Page Creek Bridge: 36 foot bridge. Located on the Page Creek Trail #39 approximately .4 miles towards Page Lake from its junction with the East Fork Trail #38.

East Fork Bridge: 36 foot bridge. Located on the East Fork Trail #38 approximately 3.5 miles from the East Fork Trailhead.

Queener Basin Puncheon: 160 foot puncheon. Located on the Continental Divide Trail #9 approximately 6.8 miles from the East Fork Trailhead.

Beaverhead Puncheon #1: 3 puncheons totaling 155 feet. Located on the Hi-line Trail #111 approximately .5 miles towards Beaverhead Pass from its junction with the Carpp Creek Trail #24.

Beaverhead Puncheon #2: 2 puncheons totaling 106 feet. Located on the Hi-line Trail #111 approximately 1 mile towards Beaverhead Pass from its junction with the Carpp Creek Trail #24.

Carpp Creek Bridge: 35 foot bridge. Located on the connecting Trail from the Carpp Creek Trailhead to the Carpp Creek Trail #24 where it crosses Carpp Creek.

Carpp Lake Puncheon: 90 foot puncheon. Located on the Carpp Lake Trail #110 approximately 2.5 miles towards Carpp Lake from the Carpp Creek Trailhead.

Tamarack Creek Bridge: 45 foot bridge. Located on the Hi-line Trail #111 approximately 700 feet towards Carpp Lake from its junction with the Glover Basin Trail #171.

Glover Basin Puncheon: 70 foot puncheon. Located on the Hi-line Trail #111 approximately .2 miles towards Porter Ridge from its junction with the Tamarack Lake Trail #4.

Edith Lake Puncheon: 108 foot puncheon. Located on the Edith Lake Trail #97 approximately .5 miles towards Edith Lake from its junction with the Hi-line Trail #111.

Middle Fork Bridge: 40 foot bridge. Located on the Falls Fork Trail #29 where the trail crosses the Middle Fork of Rock Creek.

Falls Fork Puncheon: 2 puncheons totaling 150 feet. Located on the Falls Fork Trail #29 approximately .75 miles towards Johnson Lake from the Middle Fork Trailhead.

Falls Fork Bridge: 60 foot bridge. Located on the Falls Fork Trail #29 where it crosses the Falls Fork of Rock Creek approximately 2 miles towards Johnson Lake from the Middle Fork Trailhead.

Johnson Lake Inlet Puncheons: 2 puncheons totaling 60 feet. Located on the connecting trail between the Continental Divide Trail #9 and the Hi-line Trail #111 at the inlet to Johnson Lake.

Middle Fork Bridge and Puncheons: Approximately 1 bridge and puncheons on the 1st 1/2 mile of the Middle Fork Trail #28 after it crosses the Middle Fork of Rock Creek.

SULA AND WISE RIVER R.D.

Neither have protection needs.

Burn Plan

A burn plan is completed during the Stage II Decision Analysis (see section 3, risk assessment/decision analysis). It provides the parameters for the ongoing management of a natural ignition and the sideboards for monitoring managed natural fires.

Two teams chartered to review the 1988 fire season developed components to be included in a prescribed burn plan. They are:

1. General information, map, location, fuel type, etc.
2. Fire projections using both "expected" and "most severe" weather scenario
3. Identification of maximum allowable perimeter
4. Estimates of resource needs to manage the fire
5. Cost estimates to manage the fire
6. Risk assessment that portrays the estimation of the probabilities and consequences of the decision using the following criteria as a minimum:
   - threat to life and property
   - adequate funds available
   - smoke management concerns
   - resource availability for current and anticipated needs
   - impacts on visitors, users, cooperators, local communities, etc.
   - fire predicted to remain within the maximum allowable perimeter
   - consideration of impact of other fire activity, both prescribed fire and wildfire, locally, regionally and nationally
   - predicted weather acceptable
   - drought trend acceptable based on an appropriate drought index
7. Monitoring actions
8. Holding actions
9. Contingency actions
10. Provisions to keep the public, cooperators, users and internal personnel informed
11. Provisions for daily revalidation
12. Decision criteria for daily revalidation
13. Identification of evaluation needs.

Following are several examples of burn plans used by the Forest Service and Park Service. Specific directions on burn plans may exist in agency manuals. These documents should be consulted prior to completion of a burn plan for your unit.

List of Examples - Burn Plan

26. Prescribed Burning Plan. Gila and Aldo Leopold Wilderness Prescribed Natural Fire Plan, June 1993. Gila National Forest.

27. Prescribed Natural Fire Burn Plan. Anaconda-Pintler Wilderness Fire Management Guidelines, April 1993. Beaverhead, Deerlodge, and Bitterroot National Forests.

28. Prescribed Burn Unit Plan. Wildland Fire Management Guidelines. USDI National Park Service, June 1990.

Example 3-26:

Prescribed Burning Plan

Source: Gila National Forest, Southwestern Region

_____ Prescribed Burn

_____ National Forest

_____ Ranger District

_____ Wilderness

Ignition

Natural [ ]
Management [ ]

Type of Burn

Broadcast [ ]
Pile [ ]
Other (explain) [ ]

This Burn Fits Complexity Criteria For: (FSM 5141.2)

Complex [ ]
Intermediate [ ]
Basic [ ]

Prepared By _____ Title _____ Date _____

Recommended By _____ Title _____ Date _____

Approved By _____ Title _____ Date _____

NOTE; COMPLETE ONLY THOSE ITEMS PERTINENT TO THE TYPE OF BURN BEING PLANNED. EVERY LINE/BLOCK MAY NOT BE NECESSARY FOR THE PLANNED BURN. IF ADDITIONAL SPACE IS NEEDED, USE EXTRA PAGES OR THE BACK OF A PAGE.

ITEMS PRECEDED WITH ** ARE NOT REQUIRED FOR THE INITIALIZATION OF A PNF. HOWEVER, OTHER PERTINENT OR USEFUL INFORMATION MAY BE SUPPLIED DURING THE MONITORING OR POST-BURN PHASES.

Designated Burn Boss _____

Wx Projection: Expected: _____

_____

Wx Projection: Most Severe: _____

_____

Line Officer Daily Review Record

Date	Regional Preparedness Level	Initials

(This section may also be used for other prescribed fire projects as conditions and complexities warrant; for example, Rx during very high or extreme burning conditions that are conducted over a several-day period of time.)

A. Location and Administrative Information

Management Code _____ Estimated Cost _____ **Acres _____

Source of Funding _____

**Contributed Labor or Equipment Value _____

Township/Range/Section ____/____/____ Township/Range/Section ____/____/____

Township/Range/Section ____/____/____ Township/Range/Section ____/____/____

Land Management Planning Management Area _____

B. Burn Objectives (Desired effects and tolerable deviations): _____

_____

_____

_____

C. Special Considerations (Wildlife, Soil, Timber, Public, Archeology, T&E, Scorch Height, or Sensitive Features): _____

_____

_____

D. Interagency/Intra-Agency Coordination: _____

_____

_____

E. Description of Area: (Attach map)

1. Project/Projected Size (Acres) _____

** 2. Size (Perimeter) _____

PNF (Max. Perimeter) FSM 5142.23 _____

3. Allowable Burned Area _____

** 4. Elevation: Top _____ Bottom _____

** 5. Slope % _____

** 6. Aspects _____

7. Drainage Name _____

8. Fire Behavior Fuel Model(s) (or Custom Model from BEHAVE)

_____

_____

9. Vegetation Type _____

_____

** 10. Fuel Loading (Tons/Acre by Size Class) _____

** 11. Surface Fuel Depth _____

** 12. Continuity _____

** 13. Arrangement _____

** 14. Site Preparation: (Type of line construction, fuel rearrangement, etc.) _____

_____

_____

F. Risk Assessment (for Management-Ignited Fires, see FSM 5142.1; for PNF Fires, see FSM 5142.23, item 8 and the pertinent PNF plan)

G. **Fire Behavior Necessary to Accomplish the Objectives Established in Section B Above:

1. Type of fire used (backing, head, etc.) _____

_____

2. Rate of Spread (Ch/Hr): Head _____ (Min) | _____ (Max) Backing _____ (Min) | _____ (Max)

4. Heat Per Unit Area (BTU/Sq. Ft.) _____

5. Flame Length (Feet) Maximum _____ Minimum _____ Average _____

6. Scorch Height Allowable _____

7. Other _____

8. Narrative _____

_____

_____

_____

_____

_____

H. **Burning Prescription Necessary to Obtain the Fire Behavior Described in Section G Above:

			Day	Night
1.	Temperature	Maximum	_____	_____
		Minimum	_____	_____
2.	Relative Humidity	Maximum	_____	
		Minimum	_____	

3. Fuel Moisture	Maximum	Minimum
1H	_____	_____
10H	_____	_____
100H	_____	_____
1000H	_____	_____

4. Live Fuel Moisture _____

5. Mid Flame Wind Speed _____ Direction _____

6. Soil Moisture _____

7. Time of Year _____

8. Days Since Last Precipitaion _____

I. **Test Fires

1. When Needed _____

_____

2. Where _____

_____

3. On-Site Data: Shade _____ Temperature _____ RH% _____

Fuel Sticks _____ Midflame Windspeed & Direction _____

Slope % _____ Aspect _____

4. Test Fire Results _____

_____

_____

_____

J. **Firing Plan Firing Boss _____

1. Ignition: Method _____ Equipment _____

2. Narrative _____

_____

_____

K. **Holding Plan Holding Boss _____

1. Equipment and Personnel Needs _____

_____

2. Narrative (use additional pages, if needed) _____

_____

_____

L. Mop-Up, Monitoring, Containment Plan (include extra pages, maps, organization as necessary)

1. Equipment and Personnel Needs _____

_____

2. Narrative (mop-up and to what extent; monitoring, type and how often; creep perimeters, etc)

_____

_____

3. Contingency Plan for Going Out of Prescription at Low End _____

_____

M. Escaped Fire Contingency Plan (FSM 5142.1, Item 3. Include assessment, threat forces, locations, contacts) _____

_____

_____

N. Smoke Management (Ref FSM 2580 and State/Local Smoke Management Plans)

1. Smoke-Sensitive or Problem Areas Identified _____

_____

** 2. Transport Wind: Speed _____ Direction _____

** 3. Mixing Height _____

O. Post-Burn Evaluation (include Prescription Fire Record)

1. Date _____

2. Amount of Fuel Reduced _____

3. Scorching: Height on Bole _____ Percent Crown _____

4. Undesirable Effects _____

5. Smoke Problems _____

6. Desired Results Achieved (discuss either way) _____

_____

P. Public Information

1. Pre-Burn _____

_____

_____

_____

2. Post-Burn _____

_____

_____

_____

Q. Attachments

1. Organization Charts

2. Area Map(s)

3. Project Map(s)

4. Job Hazard Analysis

5. Safety Plan (including Public Safety)

** 6. Air Operations Plan and Flight Plan

7. Communications Plan

** 8. R3-FS-2300-4, Cultural Resources Inventory Standards and Accounting (IS&A) Form.

9. Cost estimates to manage the PNF fire, FSM 5142.23, item 7.

10. Decision criteria for daily revalidation of PNF burns, FSM 5142.23, items 13 & 14.

11. Evaluation Plan on PNF for assessing outcome of the fire, FSM 5142.23, item 15.

Example 3-27

Prescribed Natural Fire Burn Plan

Source: Anaconda-Pintler Wilderness Fire Management Guidelines, April 1993. Beaverhead, Deerlodge, and Bitterroot National Forests

1	Fire Name		Administrative #
2	Approval		
	Decision Level I II III	Line Officer Approval Date Line Officer Approval Date	Line Officer Approval Date Line Officer Approval Date
3.	General Information on Ignition		
	A. Location Wilderness:		Fire Management Unit:
	Ranger District		National Forest
	Legal & Latitude/Longitude		
	B. Features at Ignition Point Fuel Type		
	Aspect		
	Elevation		
	C. Conditions ERC/Adjective Rating		
	Drought Severity Index		
	Date of Start		
4.	Map of Maximum Allowable Perimeter Based on Resource, Social/Political or Organizational Capability Constraints. (Attach to the plan)		
5.	Map of Fire Projections For:		
	A. Probable fire behavior and seasonal duration - include estimate of date fire should become inactive (Attach to the plan).		
	B. Severe fire behavior and/or seasonal duration - include estimate of date fire should become inactive (Attach to the plan)		
6.	Holding Plan		
	A. Expected actions needed to maintain fire within the maximum allowable perimeter and the timing of their implementation (Use supplement sheet if necessary.)		

	B. Resource needs to implement above actions; and/or to manage burn to conclusion.			
	Resources	Type	Duration	Cost
	Aircraft			
	Individual Personnel			
	Crews			
	Equipment			
	C. Total cost of monitoring/holding actions estimated for burn.			
7.	Contingency Planning: (Use supplemental sheet if necessary.) A. A description of the key issues or factors that would need to be considered in the preparation of an EFSA should this fire be declared a wildfire. Also identify the need to communicate with other affected protection agency jurisdictions such as NPS or State of Montana.			
	B. Actions to take if the fire exceeds prescription parameters and/or holding capabilities and cannot be maintained within prescription with project funds.			
8.	Risk Assessment: A. Describe the prevalent type of fire expected such as high intensity stand replacement, moderate intensity with partial scorching or crowning, or low intensity underburn. Also estimate the probability of holding the fire to the maximum allowable perimeter considering predicted weather and seasonal severity.			
	B. Evaluate the anticipated impacts of the fire over its expected duration in the following categories: 1. Threat to life and property: (consider permitted users, private lands, agency facilities and equipment, and other fire protection jurisdictions)			

	2. Fire's expected impact: (consider impacts on visitors, users, facilities, communities and resources both on site and off site).
	C. Probable smoke impacts and predicted emissions considering prevailing wind patterns, available fuels and expected duration of activity. Consider other prescribed natural fire and wildfire activity for cumulative impacts.
	D. Agency Obligations:
	1. Funds available for proposed actions. (YES/NO) Document Contacts:
	2. Coordinate locally and Regionally to identify actual and anticipated resource needs and their potential availability. Check compliance with Regional and additional preparedness levels. (YES/NO)
	3. Keep cooperators informed of fire's progress when appropriate. (YES/NO)
	E. Other Management Actions
	1. How will additional starts within the maximum allowable perimeter be dealt with relative to this ignition:
	2. How should additional starts within the Anaconda Pintler Wilderness be dealt with relative to this ignition:
	3. Are there cumulative impacts from prescribed natural fires of wildfires in progress that affect decisions made on this ignition: Locally? Regionally? Nationally?
9.	Monitoring actions needed to provide the prescribed fire manager with current status and estimates of potential fire action.

10.	Information Plan
	A. External (State of Montana, users, visitors, adjacent land owners, etc.)
	B. Internal
11.	Complete the Stage III analysis daily and document the results on the attached revalidation record. If significant fire behavioral changes are expected or experienced notify affected cooperating agencies.
12.	Job Safety and Health Hazard Analysis (FSH 6709.11) attached
13.	Narrative evaluation of fire from both a resource effect and managerial perspective. (Attach evaluation plan).

Example 3-28

Prescribed Burn Unit Plan

Source: Wildland Fire Management Guidelines. USDI National Park Service, June 1990.

BURN UNIT NAME

Prepared by _____ Date _____

Reviewed by _____ Date _____
Certified Prescribed Burn Boss

_____ Date _____

_____ Date _____

Approved by _____ Date _____
Superintendent

Complexity level:

Copies of approved plan sent to:

3 Examples

I. Burn Unit Description

Location: 1. T _____ R _____ Sec _____

2. Latitude N _____

Longitude W _____

3. UTM Zone _____ Easting _____ Northing _____

Size:

Elevation:

Description of Boundaries:

Slope(s):

Aspect(s):

Vegetation Type	% of Burn Unit Burn Unit	Fuel Model NFFL	Fuel Model NFDRS

II. Fuel Loading and Dead Fuels:
(assess loadings pre and post burn by dead size classes, biomass, dead to live ratio, age classes, depth etc., as applicable to fuel type.)

III. Vicinity map (attached)
Show relationship of the project to the overall geographic area

IV. Project map (attached)
Utilizing U.S.G.S. topographical sheets show the project, its boundaries, line construction, and firing patterns

V. Goals and Objectives

Circle or Underline:

1. Preserve Natural Processes
2. Hazard Fuel Reduction
3. Other (specify):

Objectives:
(quantify with specific data if possible.)

VI. Complexity

VII. Burn Organization

Personnel:

1. Prescribed Burn Boss _____
2. Ignition Specialist _____
3. Holding Specialist _____
4. Lead Fire Behavior & Weather Specialist _____
5. Safety Officer _____
6. Crew: Ignition Holding

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

VIII. Costs

PROJECTED PERSON HOURS;		Projected Costs*
1. Unit Preparation		
2. Burning		
3. Holding		
4. Monitoring		
5. Mop-up/Evaluation		

EQUIPMENT:		Projected Costs*
1. Tools		
2. Engine		
3. Fuel		
4. Mileage		

* Record Required Actual Cost Data on attached paper.

IX. Scheduling

Proposed Ignition Date: _____

Projected Burn Duration: _____

Actual Ignition Date: _____

Date Declared Out: _____

Date DI-1202 Submitted: _____

Note any dates when the burn may not be conducted during the proposed window:

X. Pre-Burn Considerations

A. Preparation Needs:

On Site:

Off Site:

B. Special Precautions/Regulations: (utility lines, historical sites, safety, etc.)

1. All burn personnel will wear standard fire fighting leather boots, Nomex pants and shirt, leather gloves and hard hat. They will carry a fire shelter and a fire tool at all times.

2. All standard wildland fire fighter safety rules will be strictly enforced (see Fireline Handbook).

XI. Burning Prescriptions and Observed Conditions

Fuel Model NFFL: _____ NFDRS: _____

Prescription

	Weather	Acceptable Range	Optimum	Observed*
1.	Temperature			
2.	Relative Humidity			
3.	Wind Direction			
4.	Wind Speed			
5.	Fuel Moisture			
*	1 Hour			
	10 Hour			
	100 Hour			
	1000 Hour			
	Woody - live			
	Herbaceous - live			

* At Time of Ignition

Fire Characteristics:

Prescription

	Characteristics	Acceptable Range	Optimum	Observed*
1.	Rate of Spread			
2.	Spread Component			
3.	Heat/Unit Area			
4.	Energy Release Comp			
5.	Flame Length			
6.	Burning Index			

* Standard Observation Time: Dates of Burn:

XII. Firing Techniques and Holding Methods

A. Firing and ignition

B. Approved holding actions

XIII. Contingency Plan

XIV. Weather Information

XV. Protection of sensitive features

XVI. Smoke management

XVII. Coordination and public involvement

XVIII. Notification

XIX. Public and personal safety

XX. Monitoring and Evaluation Procedures

XXI. Reports

1. Grand total of all personnel time, equipment and transportations: $ _____

2. Cost per acre: $ _____

3. Person days per acre: _____

XXII. Rehabilitation

XXIII. Briefing guide and Go/No Go Checklist (attached)

XXIV. Persons contacted (attached)

PRESCRIBED BURN PERSONNEL COSTS

Date Page of

Name	Grade/ Step		Regular Time			Overtime			Hazard or Environ-mental Differential			
	GS	WG	Hrs	Rate	Total	Hrs	Rate	Total	Hrs	Rate	Total	Total
TOTALS												

PRESCRIBED BURN ACTUAL COST OF SUPPLIES, EQUIPMENT AND TRANSPORTATION

Date Page of

Item	Unit	Cost/ Units	Total
		TOTAL	

Fire Management Prescriptions

Fire management prescriptions describe measurable fire behavior and effects. Traditional prescriptions generally are specific about the end result for a particular fire, and they may not be applicable in a wilderness prescribed fire program. Instead, wilderness fire prescriptions may need to rely more heavily on natural processes and the identified fire regime. Where possible, prescriptions should allow fires to burn within the range of variability of the natural fire regime.

Fire prescriptions include but are not limited to:

a. fire and its effects

b. fuel distribution, quantity, and moisture content

c. vegetation condition and moisture level

d. soil moisture

e. weather

f. time of year

g. NFDRS variables

h. ignition method

i. smoke

j. geographic area

k. limits on numbers and size of fires

Managers can evaluate acceptable conditions under which they will ignite prescribed fires or allow a prescribed natural fire to take its course. Examples are included in the two-hour decision flow chart (Risk Assessment section) and prescribed natural fire burn plan.

List of Examples - Fire Management Prescriptions

29. Prescriptions. Yosemite National Park Fire Management Plan May 1990.

30. Fire Management Prescriptions. Bridger Wilderness Fire Management Plan. Bridger-Teton National Forest.

Example 3-29

Prescriptions

Source: Yosemite National Park Fire Management Plan, May 1990.

A prescription is a set of values specifying conditions under which fires can be ignited to meet specific management objectives. For ecological burning in Yosemite the prescriptions must specify all of the conditions that are needed to simulate, as nearly as possible, a natural fire regime. These include the timing, number, burning pattern, spatial distribution, size, duration, return interval, and behavior of fires. These more general fire regime elements are incorporated within the general program guidelines, such as the designation of large units to be burned in the fall by backing fires on a return interval similar to that of natural fires. Weather, fuel moisture, and resulting fire behavior are the most variable prescription elements, and thus the most difficult to predict and control.

Prescribed burns for historic scene management in, Yosemite Valley do not simulate all elements of the natural fire regime, but will utilize the weather, fuel moisture, and fire behavior prescription elements that apply to ecological burning. The initial stages of environmental restoration in Yosemite Valley will require prescribed fires of sufficient intensity to produce the desired structural changes in the forest while remaining within the range of control. Later stages will possibly require modified prescriptions to adjust to dramatic changes in forest structure and fuel complexes.

Fire behavior prescription elements specify a range of weather, fuel moisture, and fire behavior prediction values that are dependent on fuel model and firing technique. These values delineate an optimum range of fire behaviors and effects. These prescription elements have been refined several times (van Wagtendonk 1974, Botti '1981, van Wagtendonk and Botti 1984) in response to increased knowledge of natural fire regimes and as the objectives of prescribed burning have been more clearly defined. Prescriptions are designed to keep fire behavior within the natural range of intensities despite unnaturally heavy fuel loadings in some areas. For Yosemite, these elements are based on input and output values from the Fire Behavior Prediction System (Albini 1976, Rothermel 1983). These prescription values are listed in Table 7, and will apply to all prescribed burning except research burns carried out under the supervision of the park Research Scientist.

Fire behavior prescription elements refer to calculated values, with the observed value correlations shown in parentheses. Correction factors for calculated flame lengths and rates of spread have been established (van Wagtendonk and Botti 1984), and are listed in Table 8.

Fires in mixed-conifer forests burning within prescription will reduce dead and downed fuels (including duff and litter) by 50 to 90 percent, thin understory trees (those with basal diameter of less than 6 inches [15 cm]) by 50 to 90 percent, and produce an average scorch height of less than 30 feet. These fire effects parameters are derived from the prescription and are listed as overall burn objectives within each individual burn unit plan.

Prescriptions must be interpreted within the context of burns that may advance through a unit for up to several weeks. The optimum range of weather, fuel moisture, and fire behavior will not always exist because fires may burn through many diurnal cycles, burning periods, and even weather changes. The situation is further complicated by the varying fuel and microclimatic conditions existing throughout a large unit in complex mountainous terrain and extending through a great elevational range. The prescriptions are designed to simulate much of the variability in behavior and effects that a lightning fire would produce burning under natural conditions; thus prescriptions must be viewed as general guidelines for optimum fire behavior during the peak burning period rather than as absolute constraints that must never be violated. Burns at the "hot" end of the prescription often simulate natural fire effects best, but may border on a range of intensity that is difficult to control. Such fires must be carefully managed, and thus the "hot" end of the prescription is more of an absolute constraint than is the "cool" end. Within the large parkwide units, defining the upper limits of acceptable fire

behavior is more important than is predicting all the degrees of variability that may exist within the burn. It is expected that there will be areas in which conditions will be out of prescription on the "cool" side while critical areas (often south or southwest facing slopes) are in the center of the prescription range. Also, most of the unit may go out of prescription at night.

HEAD FIRES

FUEL MODEL	5	8	1	9	2
VEGETATION	Manzanita Ceanothus Huckleberry	Incense Cedar White Fir Red Fir Sugar Pine Giant Sequoia	Perennial Grasses	Ponderosa Pine	Bear Clover
Air Temperature	30-75	30-80	30-80	30-75	40-75
Relative Humidity	30-50	20-65	30-65	30-65	20-65
Mid-flame Wind Speed (mph)	1-5	1-5	1-6	0-6	0-5
1-Hr TL Fu-l Moisture	5-7	4-8	5-8	6-8	5-10
10-Hr TL FM	9-13	6-13		9-15	7-16
100-Hr TL FM(2)		7-20		10-20	8-20
1000-Hr TL FM(2)	(1)	10-20		10-20(1)	
Live Fuel Moisture(3)	80-130				65-170
Rate of Spread (ch/hr)	7-20(11-32)	0.3-1.7(0.5-2.7)	4-143	2-7(1.8-6.4)	3-23(3.2-24
Heat/Unit Area(BTU/sq ft)	230-700	170-210	84-92	340-400	400-500
Fireline Intensity (BTU/ft/sec)	30-250	1-6	6-242	11-45	23-170
Flame Length (ft)	2-6 (12.3-36.8)	0.5-1 (.0-1.9)	1-6	1.4-2.6 (1.0-1.9)	1.9-5.0 (1.5-3.5)

BACKING FIRE

FUEL MODEL	5	8	9	2
VEGETATION	Manzanita Ceanothus Huckleberry	Incense Cedar White Fir Red Fir Sugar Pine Giant Sequoia	Ponderosa Pine	Bear Clover
Air Temperature	40-90	40-90	40-85	40-85
Relative Humidity	20-40	20-40	20-50	20-60
Mid-flame Wind Speed (mph)	0-6	0-6	0-6	0-6
1-Hr TL Fuel Moisture	4-6	3-8	4-8	4-8
10-Hr TL FM	6-10	5-10	6-10	6-10
100-Hr TL FM(2)		7-12	8-15	7-15
1000-Hr TL FM(2)		10-20(1)	10-20(1)	
Live Fuel Moisture(3)	65-120			65-170
Rate of Spread (ch/hr)	1.0-1.7(1.6-2.7)	0.2-0.3(0.3-0.5)	0.7-1.1(0.5-0.7)	1.9-3.0(2.0-3.2)
Heat/Unit Area(BTU/sq ft)	550-750	180-250	350-450	450-525
Fireline Intensity (BTU/ft/sec)	10-23	0.8-1.3	5-8	16-29
Flame Length (ft)	1.3-1.9 (8.0-11.7)	0.4-0.5 (0.7-0.9)	0.9-1.2 (0.6-0.9)	1.6-2.1 (1.1-1.5)

(1) The NFFL fuel model contains no fuels in this size class; thus recorded values do not affect calculated Rate of Spread, Heat/Unit Area, Flame Length, and Fireline Intensity. The 1000 hour time lag fuel moisture is important to assess because such fuels may be abundant in these vegetation types and may affect control, intensity, and tree scorch.

(2) The 100 and 1000 hour time lag fuel moistures must be calculated under the National Fire Danger Rating System or derived from oven-dried samples. These moistures also relate to the moisture content of the lower layers of duff, however NFDRS calculated values relate poorly to actual duff moistures after fall rains have begun. Oven drying of duff samples should be carried out if duff reduction needs to be assessed.

(3) Live fuel moisture must be estimated from Fire Behavior Prediction System tables, calculated from an NFDRS station using Woody Fuel Moisture, or derived from oven-dried samples.

Example 3-30

Fire Management Prescriptions

Source: Bridger Wilderness Fire Management Plan. Bridger-Teton National Forest.

Natural Ignition

Natural ignitions will be allowed to burn under varying weather and fire behavior conditions. The ecological significance of large fires in the wilderness is recognized, and they will be allowed, provided they meet the prescription criteria.

The following criteria are examined in the Natural Fire Decision chart (page 32) and are considered during preparation of the Prescribed Natural Burn Plan:

National and Intermountain Region preparedness levels allow declaration of a prescribed natural fire. A copy of the 1990 Intermountain Region Preparedness Plan is located in Appendix H.

Protection of life is assured. There will be adequate time to warn wilderness visitors of potential threats from the fire. There will be no predicted threat to visitors and residents outside the wilderness.

Protection of property outside the wildeness is assured.

Acceptable air quality predicted. Simple Approach Smoke Estimation Model (SASEM) predictions combined with current smoke dispersal forecasts indicate that the PNF will not cause significant smoke impacts to neighboring communities and residents. In addition, numerous smoke complaints by neighboring communities will be considered a "smoke impact."

Adequate project funding is available. There is adequate money designated at the District, Forest or Regional level to properly manage the PNF.

Adequate resources are available to implement the PNF burn plan. Adequate resources include, but are not limited to a qualified Prescribed Fire Manager, Fire Monitors, Public Information Specialists etc. to properly implement the plan.

Existing and forecast fire behavior meet prescription criteria. Weather and fire behavior forecasts indicate that the PNF will meet the prescription elements of the PNF burn plan.

Current drought index and large fuel moistures are assessed. Actual 1,000 hour and Palmer Drought Index are compared to historic records (located in Appendix C and D). Fire behavior predictions are adjusted to reflect current drought conditions.

Social, political, and economic assessment indicates there will be no significant impact to neighboring communities and residents.

Energy Release Component (ERC) is utilized as one of the initial evaluation criteria for Zone 11. The ERC is calculated daily as part of the National Fire Danger Rating System (NFDRS), and is related to the available energy (BTU) per unit area (square foot) within the flaming front at the head of a fire. The ERC is considered a composite fuel moisture index based on both living and dead fuel moistures (including 1,000 hour timelag fuels).

The actual ERC is compared to the 1964-1989 Hoback weather station seasonal tables for NFDRS model G. The actual ERC is compared to the historic low, high, and mean for that specific day, and also to the "97th percentile" (47) for the entire fire season. The 97th percentile ERC of 47 means that 97 percent of the days on record are below or equal to 47. ERC tables, along with a more detailed explanation of their use, are located in Appendix C.

Because of discontinuous fuels and low potential for fires of any size to develop, an ERC evaluation is not required for zone 1.

Human-Caused Fires

Human-caused fires will be suppressed utilizing appropriate suppression techniques as outlined in escape contingency plan, escaped fire analysis section and the Bridger-Teton NF wilderness suppression guidelines.

All wildfires, regardless of cause, that originate outside the wilderness boundary and burn into the wilderness will be suppressed utilizing the Forest wilderness fire suppression guidelines (in the wilderness portion of the fire).

Planned Ignition

Planned ignitions will be considered in areas adjacent to and into the Bridger Wilderness, where historic exclusion of fire has altered the natural fire regime and consequent fire dependent vegetation and fuel loadings.

An interdisciplinary team of resource specialists will evaluate and recommend the proposed use of management ignited fire. The interested public will also be involved appropriately in the evaluation and review process.

A separate National Environmental Policy Act (NEPA) document, and an Intermountain Region prescribed burn plan will be completed and reviewed by the above team for each project.

Management ignited fire will not be used to achieve wilderness fire objectives where lightning-caused fires can achieve them (FSM 2324.22).

Safety

Both public and personnel safety is of the utmost importance and must not be compromised under any circumstances.

Public Safety

Safety measures to protect the public should be incorporated into the Inform & Involve Plan.

Personnel Safety

When completing a job hazard analysis, be very specific about the fire-related concerns in a particular wilderness. (Refer to Smoke Management Section for references on smoke and personal health).

The ten standard fire orders and the watch out situations should be constantly reviewed and applied.

STANDARD FIRE ORDERS

F Fight fire aggressively but provide for safety first.

I Initiate all actions based on current and expected fire behavior.

R Recognize current weather conditions and obtain forecast.

E Ensure instructions are given and understood.

O Obtain current information on fire status.

R Remain in communication with crew members, your supervisor, and adjoining forces.

D Determine safety zones and escape routes.

E Establish lookouts in potentially hazardous situations.

R Retain control at all times.

S Stay alert, keep calm, think clearly, act decisively.

WATCH OUT SITUATIONS

1. Fire not scouted and sized up
2. In country not seen in daylight
3. Safety zones and escape routes not identified
4. Unfamiliar with weather and local factors influencing fire behavior
5. Uninformed on strategy, tactics and hazards
6. Instructions and assignments not clear
7. No communication link with crew members/supervisor
8. Constructing fireline without safe anchor point
9. Building fireline downhill with fire below

10. Attempting frontal assault on fire
11. Unburned fuel between you and the fire
12. Cannot see main fire, not in contact with anyone who can
13. On a hillside where rolling material can ignite fuel below
14. Weather is getting hotter and drier
15. Wind increases and/or changes direction
16. Getting frequent spot fires across line
17. Terrain and fuels make escape to safety zone difficult
18. Taking a nap near the fireline

List of Examples - Safety

31. Public Safety. Absaroka-Beartooth Wilderness Fire Management Guidebook, July 1993. Custer and Gallatin National Forests.

32. Wilderness Visitors Caution. USDA, Forest Service.

33. Trail Closed to Public Use. USDA, Forest Service.

34. Wilderness Visitors Information. Teton Wilderness. Bridger-Teton National Forest.

35. Wilderness Fire Information. Selway-Bitterroot Wilderness. Bitterroot, Lolo, Nez Perce, and Clearwater National Forests.

36. Job Hazard Analysis. USDA Forest Service. FSH 6709.12.

Example 3-31

Public Safety

Source: Absaroka-Beartooth Wilderness Fire Management Guidebook, July 1993. Custer and Gallatin National Forests.

The concept of public safety in wilderness is covered in the forestwide resource management prescriptions, standards, and guidelines of the Forest Management Plan: "Personal risk and challenge associated with adverse weather conditions isolation, physical hazards, and lack of rapid communication and travel are appropriate features of the wilderness setting, and it is neither practical nor desirable to eliminate those risks."

With that criterion in mind, the following standards will be utilized to inform wilderness users of safety concerns and minimize the chances of endangering the personal safety of users in the wilderness as a result of the prescribed fire management program.

1. Wilderness users will be advised of the hazards and risks in the fire area, as well as safe routes in the vicinity of the fire area.

2. Trailheads, and trails in the vicinity of the fire area will be signed appropriately, advising wilderness users of fire status, hazards and risks, as well as suggested alternative routes of travel. Signing will include trailheads in the Shoshone National Forest, Yellowstone and Grand Teton National Parks, and the John D. Rockefeller Parkway. Backcountry rangers and work crews will be updated routinely so they can alert visitors they contact.

3. If a fire is along a major access route, Visitor Information (VIS) personnel will be assigned to contact and advise visitors as they enter the fire vicinity.

4. Visitors will be encouraged to document their travel plans and proposed campsites in the trail register system. This would facilitate contacts if fire conditions change dramatically.

5. In the event fire conditions deteriorate significantly, and there is imminent danger to known visitors; the line officer may elect to use the forest helicopter to warn users and make evacuations of those users incapable of responding rapidly.

6. The Line Officer may request official closure of trails and campsites in the fire vicinity he/she feels that the fire presents significant threats to life and visitor safety.

OUTFITTER CAMPSITES

The Buffalo Ranger District will maintain close communication with special use permit outfitter camps located in the vicinity of the fire. Outfitters will be briefed on fire status, expected fire behavior, and any management actions taken on the fire.

The possibility exists that some temporary outfitter camp locations may be damaged by fire. If this happens, the Forest Service will assist and give first consideration to affected permittees. Any known tangible damage to private property will be immediately investigated by the Forest Service.

Example 3-32
Source: USDA, Forest Service

WILDERNESS VISITORS
CAUTION

A lightning-caused fire is being allowed to burn under natural conditions along or near this trail. If you travel in the vicinity of the fire, beware of the following hazards:

*Erratic fire behavior

*Rolling rocks and logs

*Falling snags and trees

FIRE NAME:

FIRE LOCATION:

For further information contact:

Example 3-33
Source: USDA Forest Service

WILDERNESS VISITORS
NOTICE
THIS TRAIL CLOSED
TO PUBLIC USE

A lightning-caused fire is burning under natural conditions near this trail.

Concern for public safety prohibits access until fire conditions change.

Hazards associated with fires include:

***Rapid spreading of flames**

***Falling snags or trees**

***Heavy smoke and limited visibility**

***Rolling material such as rocks and logs**

FIRE NAME:

FIRE LOCATION:

Example 3-34
Source: Teton Wilderness. Bridger-Teton National Forest

WILDERNESS VISITORS INFORMATION

You are entering the Teton Wilderness where some fires may be allowed to burn as part of a program to return fire as a natural force to the ecosystem.

When traveling in the vicinity of a fire please use extreme caution.

For further information contact:

Example 3-35
Source: Selway-Bitterroot Wilderness. Bitterroot, Lolo, Nez Perce, and Clearwater National Forests.

SELWAY-BITTERROOT
Wilderness Fire Information

You are now entering an area where fires are either managed as a part of the Prescribed Natural Fire Program or suppressed as wildfires. Fire continues to shape the natural ecosystems that have made the wilderness what it is today.

WATCH OUT FOR THESE HAZARDS:

- Falling snags or trees
- Rapid spreading flames
- Rolling material such as rocks or logs
- Heavy smoke and limited visibility
- Holes from burned out stumps

Fire locations nearby : (See map for closures and locations).

FOREST SERVICE U S DEPARTMENT OF AGRICULTURE

For more information, contact:

Example 3-36
Source: USDA Forest Service. FSH 6709.12.

USDA - Forest Service	1. Identify Job or Project to be Analyzed **Prescribed Natural Fire**	2. Location	3. Unit
JOB HAZARD ANALYSIS Reference FSH 6709.12	4. Name of Analyst	5. Job Title of Analyst	6. Date Prepared

7. Hazards	8. Actions to Eliminate Hazards
1. TRAVEL	
A. VEHICLE: Most vehicle travel will be on narrow mountain roads.	Follow all guidelines in FS Health and Safety Code handbook, Chapter 2. Also follow all Regional and agency driving rules as per Drivers Operators manual. Use good defensive driving techniques and follow direction in the Bitterroot Safety Plan.
B. FOOT: Walking to a Prescribed Fire on a trail or cross country.	When walking to a fire follow all safety procedures for foot travel as stated in the FS Health and Safety Code Handbook, and the Fireline Handbook. Know what the fire is doing at all times and have constant radio communications with someone who does.
C. AIRCRAFT: Flying in fixed wing or helicopter.	Follow all National, Regional and Forest Air Safety guidelines when flying. Contact Forest Air Operations person if you have questions concerning air safety and flight following. When monitoring or reconning fire make sure all air safety rules are followed.
D. FLOATING: Floating on rivers with all types of boats.	Follow all the safety regulations concerning water travel mentioned in the FS Health and Safety Code Handbook, Chapter 2-11. Follow all directions that the operator of the boat gives you.
2. MONITORING A PRESCRIBED FIRE ON THE GROUND	Treat a prescribed natural fire as a wildfire with no control lines. All firefighting safety procedures for wildfire shall apply including the use of fire shelters unless otherwise determined by a line officer. All required personnel protective equipment for wildfire shall be used, refer the FS Health and Safety Code Handbook and Fireline Handbook. Make sure overnite camps are established in safe locations, so fire will not threaten them. Ground crews will have communications with lookouts, dispatcher or overhead while on the prescribed fire. The Burn Boss or Prescribed Fire Manager shall keep the monitoring crew or other crews updated on fire situation at all times. This will include the movement and spread of the fire and predicted fire weather forecasts. The ten standard firefighting orders and situations that shout watch out will be followed at all times.

7. Hazards	8. Actions to Eliminate Hazards
2. Ground Monitoring (cont.)	Avoid prolonged exposure to smoke, stay out of low inversion layers as much as possible. An emergency evacuation and survival plan shall be prepared and followed. All ground assigned should be familiar with the burn plan and the assignments for overhead and who is in charge. Only people that qualify for monitoring of prescribed natural fires and the fire situation shall monitor on the ground or in the air. Prior to any people or crews being sent to a prescribed natural fire on the ground they will be briefed on all of the above mentioned items as well as their assigned responsibilities and contents of the Prescribed Natural Fire Burn Plan.
3. ALL ACCIDENTS AND INCIDENTS SHALL BE REPORTED	Make sure all accidents are reported. Attitude is a key to the prevention of accidents. Most accidents can be prevented by having a positive safety attitude.
4. PUBLIC AND USER SAFETY:	Post all public access trails and roads telling the public and other users that they are entering an area where fires are allowed to burn under certain criteria. Sign trailheads showing locations of fires that are under prescription and are burning. Keep media updated at all times on status of active fires.
5. PRESCRIBED NATURAL FIRE GOING TO WILDFIRE STATUS:	All safety procedures required for wildfire shall be followed. All agency, public and other users shall be notified of the status of the escape and warned to stay out of the areas that threaten their safety.
6. USE OF STOCK OR OTHER PACK ANIMALS:	All safety procedures in use of stock or other animals shall be followed according to the FS Health and Safety Code Handbook, Chapter 2, sections 8 and 10. Also follow any other safety guidelines concerning the use of pack animals such as the use of llamas or dogs as well as stock.

9. Approved By:	10. Title	11. Date

Monitoring & Evaluation

Operational monitoring and evaluation of a prescribed fire program is the systematic process of collecting and recording data on vegetative cover and condition, topography, weather, air quality, fire behavior, and fire effects. Monitoring is done for a couple of reasons: 1) to ensure that the fire is staying within the parameters established in the burn plan and 2) to provide a basis for evaluating and adjusting future prescribed fire programs in wilderness. The 1964 Wilderness Act guides managers to "secure for the American people...and future generations the benefits of an enduring resource of wilderness...unimpaired for future use and enjoyment as wilderness." Wilderness prescribed fire monitoring is neccessary to assess how well these goals are being achieved and to assess how well the specific wilderness goals and objectives for a particular wilderness are being met. This reemphasizes the need to identify acceptable outcomes prior to initiating a wilderness prescribed fire program.

In a paper presented at the Wilderness Fire Symposium, Missoula, Mont., 1983, Bureau of Land Management Manager Gardner W. Ferry identified reasons for monitoring. He also listed the more common monitoring items based on input from other fire managers.

- Safety concerns; to protect life and property.
- To ensure the fire remains in prescription and inside boundaries.
- To obtain fire behavior prediction information.
- To determine if objectives are being met.
- To anticipate potential problems.
- Smoke management.
- To give feedback to the public.
- To keep line officers apprised of activities.
- To gain information on cost.

More common monitoring items:

- Size
- Fire behavior (spotting, crowning, torching, rate of spread).
- Weather (temperature, relative humidity, precipitation, windspeed and direction).
- Fuel moisture.
- Direction of travel of fire front.
- Location of the fire, especially regarding special concerns.
- Topography.
- Fuel type (by stylized model).
- Smoke plume direction.
- Fire effects (water quality, air quality, habitat and population dynamic studies on wildlife).

Some of the items listed are real time monitoring (while the fire is burning), while others are post-fire monitoring. It is important to realize that both are needed. Even more important, is the need for both wilderness and fire managers to truly analyze the collected data and use it to verify or change the current Wilderness prescribed fire program.

The following are examples of prescribed fire monitoring methods of differing complexity.

List of Examples - Monitoring and Evaluation

37. Prescribed Natural Fire Evaluation Form. Anaconda-Pintler Wilderness Fire Management Guidelines, April 1993. Beaverhead, Deerlodge, and Bitterroot National Forests.

38. Prescribed Natural Fire/Wildfire Index Plot Data Sheet. Alpine Lakes Wilderness Prescribed Natural Fire Management Action Plan, April 1993. Wenatchee and Mt. Baker-Snoqualmie National Forests.

39. Prescribed Natural Fire/Wildfire Fire Behavior Datasheet. Alpine Lakes Wilderness Prescribed Natural Fire Management Action Plan, April 1993. Wenatchee and Mt. Baker-Snoqualmie National Forests.

40. On-site Weather Data. Alpine Lakes Wilderness Prescribed Natural Fire Management Action Plan, April 1993. Wenatchee and Mt. Baker-Snoqualmie National Forests.

41. Smoke Monitoring Data. Alpine Lakes Wilderness Prescribed Natural Fire Management Action Plan, April 1993. Wenatchee and Mt. Baker-Snoqualmie National Forests.

42. Monitoring Post Burn Conditions. Alpine Lakes Wilderness Prescribed Natural Fire Management Action Plan, April 1993. Wenatchee and Mt. Baker-Snoqualmie National Forests.

43. Implementation Monitoring. Eagle Cap Wilderness Fire Management Plan, July 1992. Wallowa-Whitman National Forest.

44. Effectiveness Monitoring. Eagle Cap Wilderness Fire Management Plan, July 1992. Wallowa-Whitman National Forest.

45. Validation Monitoring. Eagle Cap Wilderness Fire Management Plan, July 1992. Wallowa-Whitman National Forest.

Example 3-37

Prescribed Natural Fire Evaluation Form

Source: Anaconda-Pintler Wilderness Fire Management Guidelines, April 1993. Beaverhead, Deerlodge, and Bitterroot National Forests.

Fire Name: _____ Date: _____ / _____ / _____

Evaluator:

FOR EACH OF THE FOLLOWING STEPS INCLUDE WAYS TO IMPROVE

1. Decision flow smooth and timely? ( )yes ( )no
   Remarks: _____

2. Accuracy of Fire Behavior Predictions:

3. Safety Considerations: Any injuries? Effective public safety and I & I efforts:

4. Cost Effectiveness:

5. Smoke Management Impacts:

6. Effects on Vegetation:
   Total Acres _____ %Crown Fire _____
   % Lethal Underburn _____ % Non-lethal Underburn _____
   % Unburned _____

7. Other effects: (Soil, water, wildlife, trails)

8. Remarks, observations, recommendations:

ATTACH MAP

Example 3-38

Prescribed Natural Fire/Wildfire Index Plot Data Sheet

Source: Alpine Lakes Wilderness Prescribed Natural Fire Management Action Plan, April 1993. Wenatchee and Mt. Baker-Snoqualmie National Forests.

Plot ID# Date: / /

Fire Name: Monitor:

Plot location: (sketch map)

Vegetation Line:

Species and number of intersects:

Line #	Species	Number along line

3 Examples

Fuels Line:

Describe size and number of wired sticks:

Line #	Size Class

Understory Plot:

Describe size, number and species of trees:

Species	Size*	Number

*Mature (M) Poles (P) Saplings (S)

POST-BURN DATA

Duff reduction: List observed reduction for each pin. Sum and average for the plot.

Line #	Pin #	Reduction
Average		

Fuels reduction: List measured reduction for each wired stick. Sum and average.

Line #	Wire #	Reduction

Average _____

Vegetation lines: Note burn severity along each line.

Line #	Burn Severity Observed

Understory Circular Plots: Note burn severity for each plot.

_____

_____

_____

_____

_____

_____

_____

Example 3-39

Prescribed Natural Fire/Wildfire Fire Behavior Datasheet.

Source: Alpine Lakes Wilderness Prescribed Natural Fire Management Action Plan, April 1993. Wenatchee and Mt. Baker-Snoqualmie National Forests.

Plot ID# Date: / /

Fire Name and Number Observer:

Location							
Photo #							
Fuel Model							
Time							
Aspect							
Slope %							
Shading %							
1 Hour FM % *							
1000 Hour FM% *							
Live FM% *							
ROS (Head) feet/minute							
ROS (Back) feet/minute							
ROS (Side) feet/minute							
Flame Length							
Flaming Zone Depth							
Probability of Ignition *							

* These values must be calculated or found in "look-up" tables

Example 40

On-Site Weather Data

Source: Alpine Lakes Wilderness Prescribed Natural Fire Management Action Plan, April1993. Wenatchee and Mt. Baker-Snoqualmie National Forests.

Plot ID# Date: / /

Fire Name and Number: Observer:

OBS Date	OBS Time	Wind Speed	Wind Dir	D.B. Temp	R.H. %	Comments

Example 3-41

Smoke Monitoring Data

Source: Alpine Lakes Wilderness Prescribed Natural Fire Management Action Plan, April1993. Wenatchee and Mt. Baker-Snoqualmie National Forests

Plot ID# Date / /

Fire Name and Number Observer

Time:

MONITORING FREQUENCY - EVERY 30 MINUTES

VARIABLE											
Fireline Visibility (feet)											
Down Wind Visibility (Miles)											
Complaints # **											
Visibility (Miles)											
Sensitive Areas **											
Mixing Height (feet)											
Transport Winds (Direction)											
Transport Winds (Speed) **											
Mid-Flame Winds (Direction)											
Mid-Flame Winds (Speed)											

Total Suspended Particulate Production (lbs) **

Total Fuel Consumption **

Other observations or comments:

** These variables or values will be documented post-burn.

Example 3-42

Monitoring Post Burn Conditions

Source: Alpine Lakes Wilderness Prescribed Natural Fire Management Action Plan, April 1993. Wenatchee and Mt. Baker-Snoqualmie National Forests.

Burn Severity:

Visual assessments of burn severity allows managers to broadly predict fire effects on monitoring variables.

Burn severity rating should be made every 3 meters along the plot lines. At each sample point, evaluate burn severity to organic substrate (duff and litter) and to the above ground plants. Use the burn severity index matrix below to describe the burn severity.

	Unburned	Scorched	Lightly Burned	Moderately Burned	Heavily Burned
Duff & Litter	Not Burned	Litter partially blackened Duff nearly unchanged	Litter charred to partially consumed Upper duff layer burned	Litter nearly consumed Duff deeply burned Light colored ash	Litter & duff consumed Mineral soil visible reddish color
Shrubs Forbs Herbs Trees Under-story	Not burned	Foliage scorched and attached to supporting twigs	Foliage and small twigs partially to fully consumed	Foliage twigs and small stems consumed	All plant parts are consumed leaving no major stems
Trees Over-story	Not burned	Scorch height >12"	Basal charring Scorch height >3'	Lower crown scorch. Scorch height >10'	Crown partially removed. Some mortality. Scorch height >12'

Measure fuels reduction by noting the space, in inches, between the wire and the burned fuel stick.

Measure duff reduction by noting the length, in inches, of the exposed duff pin.

IMPLEMENTATION MONITORING

Activity	Monitoring Objective	Method(s)	Unit of Measure	Magnitude and Frequency	Responsibility
Project Montiroing	Document the final acres burned, number of fires and costs.	5124.24 Exhibit 01	Acres, Dollars	100% annually	Eagle Cap Ranger (FMO)
Project Monitoring	Document for future evaluation the specifice of each prescribed antural fire.	Use Form WW-5140-14(8/91); see FMAP, Chapter 40	# Fires	100%	Eagle Cap Ranger (FMO)
Implementation Practices	Determine if the elements of the PNF Plan are properly being carried out.	Review of fire on the ground, burn plan, and all documentation. Written report of fire review.	# Fires	10% of Class A/B/C fires over a five year period and 100% of Class D and larger fires annually.	Forest Superivsor (Recreation and Fire Staff Officers).
PETS - Sensitive Species	Determine if PETS species and their habitat are being adequately addressed in PNF decisions and if decisions are resulting in appropriate projected outcomes.	Wildlife Biologist/Fish Biologist/Botanist review decision process/involvement and PNF results.	N/A	Annually	Eagle Cap Ranger (Wildlife Biologist/Fish Biologist/ Botanist).
Old-Growth	Determine if old-growth loss is consistent with Forest Plan assumptions. Are old-growth linkages and large reserviors of old-growth being managed.	Report acres of ofl-growth impacted by PNF and determine spacial realationship of lost old-growth and remaining old-growth.	Acres	Annually; with a summary report every 5 years or when cumulative old-growth loss is determined to be substantial.	Eagle Cap Ranger (Wildlife Biologist).
Fisheries/Watershed	Determine if fisheries and water quality parameters are met following PNF.	Use appropriate modeling and field measurements, commensurate with amount of fire activity.		Following any large scale PNF.	Eagle Cap Ranger (Fish Biologist/Watershed Specialist).

Example 3-43 (See pg. 175 for source)

Example 3-44 (See pg. 175 for source)

EFFECTIVENESS MONITORING

Activity	Monitoring Objective	Method(s)	Unit of Measure	Magnitude and Frequency	Responsibility
Smoke Management	Are the smoke modeling tools and implementation practices effective in minimizing the impacts of smoke and meeting regional haze objectives and PM10 abjectives in local communities?	Part of the written report for implementation practices monitoring from above.	Same as above	Same as above	Same as above
Smoke Management	Is the PNF Program effective in meeting public perceptions of the program and in addressing smoke management concerns of local and sub-regional communities?	Written report documenting results of public surveys and other methods of gathering public information on the effects of PNF smoke impacts.	Reports; Wilderness and Forest Plan M&E Report.	Annually	Forest Supervisor (Public Affairs Officer).
Ecosystem Management	Is the PNF Program efective in restroing the ecosystem to a natural and/or desired condition and in the anticipated timeframe? Are the Desired Future Conditions for the wilderness being achieved?	Written report documenting fire effects on selected fires, changes in the ecosystem and determining if the Standards and Guidelines and DFC's are being achieved.	Reports	Once every five years	Forest Supervisor (Range, Wildlife, Water, Soil, Ecology, Staff Officer and Air Quality Staff Officer).

VALIDATION MONITORING

Activity	Assumptions in Plan Development	Responsibility	Method of Validation Monitoring
Fire Regimes	The fire regimes in the ECW are similar to the regimes in other areas of the western Rock Mountains.	Forest Supervisor (Fire Staff, Ecology Staff Officers)	The plan assumed that fire regimes in the Cagle Cap Wilderness are similar to other areas i n the western Rockies. Validation monitoring would examine the fire regimes in the Eagle Cap Wilderness. This would require long term studies to determine fire periodicity, location, size, and severity. Options include research projects, Technical Fire Management (TFM) projects and volunteer studies form Universities.

Wildfire Suppression

Any plan that addresses fire management considerations for either wilderness or non-wilderness lands must consider protection standards also. The broad protection objective is to "suppress wildfires at minimum cost plus loss consistent with land and resource management objectives and fire management direction as stated in the fire management action plans". Often, the land and resource management objectives relative to fire suppression in wilderness are not well articulated. This can result in practices being employed which may not always be appropriate for Wilderness.

Some basic questions about fire protection should be addressed, such as:

- Is there a difference in what appropriate fire suppression response is taken depending on the cause of the fire?
- Is there a difference in what appropriate fire suppression response is taken depending on the time of year of the fire?
- Is the goal of suppression to minimize acreage burned or the disturbance caused by the suppression effort?
- Do temporary disturbances of a modern nature, like aircraft noise, outweigh longer term but primitive impacts, like trail damage from a pack string ?
- Is it important to minimize the period of time that a suppression action is taking place?
- Are the chemicals used in retardant and foams a threat to the area?
- Is the color of retardant a consideration?

Having a consistent response to questions like these will enable wilderness and fire managers to better determine the appropriate suppression response. Without them the actions will most likely default to those which simply result in the least cost plus loss without consideration for the wilderness resource objectives.

Agency philosophy and individual wilderness situations and needs must be incorporated into a suppression philosophy for each wilderness. This guiding philosophy does not necessarily have to be in writing, although that is preferred. However, it is essential that both wilderness and fire managers work closely with the deciding official to define that philosophy and effectively communicate it to all the potential players (wilderness rangers, helitack crew, initial attack Incident Commanders, resource advisors, etc.). This is true for all fires, regardless of size or number of firefighters.

When a fire does reach the point where either a Fire Situation Analysis (FSA) or Escaped Fire Situation Analysis (EFSA) is needed, it is, again, critical that both fire and wilderness personnel be involved with the line officer in developing that document.

Assumptions made in such an important planning and decision document without the involvement of the local wilderness manager from the onset of the incident, can easily miss identifying integral considerations of the wilderness resource. The FSA or EFSA for a wilderness wildfire should contain this joint input in all versions. If after the Incident Command Team takes over a wilderness wildfire, the EFSA needs revision or updating, it is important that the wilderness manager is again involved with the fire personnel in updating the EFSA, and not just as a resource advisor after decisions are made.

Minimum Tool

Section 4(c) of the Wilderness Act states that "...except as necessary to meet minimum requirements for the administration of the area for the purpose of the Act (including measures required in emergencies involving the health and safety of persons within the area) there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area."

From the two words "minimum requirements" the concept of "minimum tool" has evolved as one of the most significant operational tenets of administration of wilderness. The minimum tool concept is broader than evaluating use of motorized or mechanized equipment. It is identifying and using the minimum action or force, regulation, equipment, or tool required to achieve wilderness objectives. Once the decision has been made that an action is necessary the minimum tool is selected. In the case of firefighting, the minimum tool may be a couple of firefighters with shovels and bladder bags. In other situations, the minimum tool may be a helicopter or a retardant plane.

Minimum Impact Suppression Tactics (MIST)

Whether the appropriate suppression response is prompt control at the smallest acreage possible or confinement of a fire to a specific drainage, the tactical approach to achieve that objective can have a major effect on the natural resources of the area. Determination of appropriate tactics that achieve suppression objectives without unnecessary environmental impact is part of the inherited change that came with the move from fire control to fire management. It involves not just the firefighter, but all levels of management as well. Firefighters, fire managers, and land managers need to assess the effect of tactics used during fire suppression just as the effect of any proposed project is assessed using the environmental assessment process.

Accomplishment of minimum impact suppression tactics originates with instructions that are understandable, stated in measurable terms, and communicated both verbally and in writing. MIST does not mean "no action" or non-aggressive suppression action. It means that the potential effects on vegetation and resource values of the area are important factors in selecting a tactical approach in suppressing a fire.

Adherence to this important principle will go a long way toward protecting the values and integrity of wilderness.

List of Examples - Wildfire Suppression

46. Minimum Impact Suppression Tactics. Francis Mohr, Wallowa-Whitman National Forest.

Example 3-46

Minimum Impact Suppression Tactics

Source: Francis Mohr, Wallowa-Whitman National Forest

When we suppress a wildfire in wilderness areas, is it possible to leave few, if any, scars? Historically, aggressive suppression activities were used to control wildland fires, and many of these activities produced major visual imprints on the land. But in recent years. some managers have been attempting to use "light-hand-onthe-land" suppression tactics to avoid unnecessary adverse impacts on natural resources (Mohr 1989).

I had the opportunity to witness the light-hand approach during the 1,790acre (724 ha) Kitchen Creek Wildfire on Idaho's Salmon National Forest, North Fork Ranger District, from August 14 to 20, 1991. Reflecting back, I can remember some major events that made light-hand suppression tactics possible—and the concept worked.

Directions From the Land Manager

"You have a fire order to work as my resource advisor with the incident team and field crews to implement light-hand-on-the-land suppression tactics on our wildfire," District Ranger Roger Thomas said to me on the morning of the first day of the fire. There was no doubt in my mind (nor anyone else') about this land manager's fire suppression direction.

"You've been directed to contain this wildfire using a light-hand-on-the land approach," was the statement in District Ranger Thomas's "Delegation of Authority" to Roy Johnson, the Incident Commander, and his national incident team. Incident Commander Johnson, from the Bureau of Land Management at the Boise Interagency Fire Center, Boise, ID, reiterated this message periodically that evening as members of his national team arrived from their home base throughout the Intermountain West.

Commitment

From the beginning to the end of this wildfire, it was clear Incident Commander Johnson's national incident team was determined to meet this relatively new management direction. As I remember them, event occurred in the following way:

First Decisions. Within the first hour of their arrival, Merrill Saleen from the Payette National Forest and Dave Schen from the State of Utah Forestry Department (the operations chiefs), Joe Bistryski from Ashley National Forest (the air operations manager), and I discussed specific suppression tactics to contain the fire's perimeter and ensure its control. We also discussed the impact of helicopter use, because the firefighting crews would have to be flown into the remote location of the fire. We decided the actions we took must have minimal or no adverse impact on this wilderness resource.

Outline of Tactics. We developed and reviewed an outline of appropriate suppression tactics with various fuel situations. Then it was approved by Tom Zimmerman, planning section chief from the Denver office of the National Park Service. The outline was included in each daily Incident Action Plan. Since we anticipated that fire crews would have to sleep in a "spike camp" (temporary overnight site) along the perimeter of the fire, we also inserted a list of "no-trace" camping techniques and conduct in the Incident Action Plan. Both the appropriate suppression outline and spike camp tactics list appeared in every daily Incident Action Plan until the team left the fire.

Final Word to Departing Crew. Before the departure of the crews to the wildfire area, the four division group superintendents—Dave Baumgartner, Wasatch-Cache National Forest; Dave Bull, Caribou National Forest; Tony DeFalco, Las Vegas office of the Bureau of Land Management, and Gary Elliot, Payette National Forest—stressed that the crews were to use the specific tactics listed in the outline. Eight interagency hotshot crews

worked to suppress the wildfire: Alpine, Sawtooth, Black Mountain, Silver State, Flame-N-Go's, Logan, Prineville, and Zig Zag.

Selecting Helicopter Landing Sites. Before he selected locations for helicopters to land crew members, the air operations manager held an in-the-air review of proposed sites. Together, District Ranger Thomas, the helitack foreman, and I (as the resource advisor) discussed helispot construction impacts, safety, and probable restoration measures. This concern was another indication of the team's commitment to District Ranger Thomas's fire suppression direction.

Site Restoration. After the wildfire had been suppressed, Incident Commander Johnson, Deputy Incident Commander Ron Sanden from the Fishlake National Forest, and both operations chiefs visited the constructed helispots to observe the restoration efforts and discuss the best methods to make the site "blend in" with the natural, surrounding landscape. Sanden remained to test various rehabilitation techniques until he was certain the site would be satisfactorily restored to as natural a condition as possible.

Monitoring and Feedback

Aside from involvement with the team, my role was to observe how the ground crews implemented the lighthand fire suppression tactics. I was impressed that even though some had doubts about this approach and were uncertain that the tactics would work, they still were determined to meet the challenge of extinguishing the fire with light-hand techniques. It was a positive and rewarding experience to listen to their discussions of the approach that would leave little evidence of their having ever been in the area. Subsequently, I was the witness to their success.

Onsite and Aerial Monitoring. When the fire was about 75 percent contained, District Ranger Thomas conducted both onsite and aerial monitoring of techniques being used by the ground crews. That evening during the strategy planning and briefing meeting, Thomas commended the eight crews for their efforts but also expressed his concern about the long-term adverse impacts that some helispot construction had caused.

Mitigating Measures. District Ranger Thomas, both operations chiefs, the air operations manager, and I discussed mitigating measures for environmental and resource impacts caused by the helispots. We developed a list of rehabilitation techniques and included them in the Incident Action Plan. The next day, crew members rehabilitated helispots that were no longer important in the suppression activity.

"No Trace" Spike Camp Techniques and Conduct

- Select impact-resistant sites
- Avoid cutting vegetation or tree boughs for bedding and camping sites
- Avoid any trenching for bedding sites
- Avoid constructing too many campfire sites
- Limit travel routes to and from camp
- When leaving campsite: Restore area to as "natural" a condition as possible; scatter charcoal from campfire and rocks used for the fire ring; cover campfire site with soil and blend in with natu ral surroundings; and pick up all garbage and noncombustible materials, such as aluminum foil, and carry this material from the site.

Evaluation and Recognition

A week after the Kitchen Creek Wildfire began, I left the area of the incident to return to my official station in Baker City, OR. As I flew over the Frank Church—River of No Return Wilderness, I reflected back on what I had observed. I had a positive feeling about the entire week—what I had observed, the land manager's direction, the determination of the team and crew members to get the job done correctly. I was more convinced than ever that we had the skills, technology, and ability to suppress future wildfire without leaving a heavy-handed imprint of our actions on the land. Yet, I could remember past frustrations and long-lasting adverse impact from previous wildfire situations all too well .

It had not been long before this wildfire that I had seen the phrase "light hand on the land" as a written objective in some Incident Action Plans for other wildfires. But in those cases, implementation had not happened. It was

HOW TO REHABILITATE CONSTRUCTED HELISPOTS

The Impact. Helispot construction in wilderness areas can cause a double impact:

- Abrupt or unnatural appearing openings in a timber- and vegetation-covered landscape
- Cut faces of tree boles and stumps

Restoration Suggestions. Before starting restoration, walk through an adjacent, untouched area and observe the appearance, arrangement, and color scheme of a naturally evolved forest. Notice the variety and diversity of the natural landscape. Use what you have observed from the natural landscape to guide restoration efforts. Here are some things you can do:

- If bolewood can be moved, place the cut-end against or underneath existing downed material.
- For large bolewood that cannot be moved, place a slant cut (45° to 60° angle) on the bottom side.
- Cut stumps flush and camouflage them to blend in with the surrounding natural landscape. Scatter the sawdust and mix it with the natural surface debris.
- To camouflage cut faces of stumps and bolewood, use a variety of natural materials such as rocks, dead woody material, fragments of stumps, bolewood or limbs, soil, and fallen or broken green branches.
- As necessary, bring some natural material from adjacent, untouched areas to camouflage cut faces of stumps and boles. However, don't move excessive amounts of dead, downed woody debris; partially decomposed stumps and bolewood; or fragments of stumps and bolewood within or into the constructed helispot area. Excessive movement of such material could cause additional unnatural appearances.
- Do not lop and scatter tops of cut trees. (Lopping and scattering could create a harvest or precommercially thinned appearance instead of a natural landscape.)
- Selectively place a few of the cut saplings in an upright position, wedging them between downed logs, old root wads, and the like to recreate a natural appearing area with a few dead, standing trees rather than leaving a pile of slash.
- If there has been an excessive amount of bucking, limbing, and topping, consider slinging cut material from the helispot.
- Consider using explosives on some stumps and the cut face of bolewood (the end-result will resemble a wind-fallen tree).

For the 12-page, pocket-sized field guide, "Light Hand Tactics," that covers land manager, incident team, and firefighter considerations as well as implementation guidelines, contact Francis Mohr at (503) 523-6391 or P.O. Box 907, Baker City, OR 97814.

quite clear that when the fire was over and the land managers were visiting the wildfire sites they were displeased a light-hand approach had not been used. Yet they voiced their disapproval when it was too late. Why weren't they more vocal at the beginning or while the fire was being suppressed?

In another situation, I had been confronted by a few who expressed concern that the light-hand-on-the land concept was advocating nonaggressive fire suppression. It would "tie the hands of the firefighters from doing what they know best," or "jeopardize safety." And of course, I also heard from a few who labeled the concept as ridiculous and impractical in reality.

Recalling those cases made me wonder if our fire training had so strongly overemphasized fire as "an enemy" that we were immune to the long-lasting adverse impacts or resource damage caused during some fire suppression activities. Were we so ingrained with controlling the "fire against time" instead of "managing it with time" that we had completely overlooked our agency's motto of "caring for the land"? Suppression of a wildfire does not give us license to overlook this basic goal of land ethics and prudent land stewardship.

Then I thought back on the past few days and the scenes I had recently witnessed. We had suppressed a wildfire, and we had cared for the land and protected resource values. In particular, I remembered the innovative measures that one crew had used to mitigate existing conditions at one of the helispot areas. I had sensed their pride when, at the end, the site appeared to blend in with the surrounding natural landscape.

Yes, it had worked! We had proven that it was possible to suppress a wildfire while caring for the land and protecting resource values. But it was also obvious some major events had occurred that made it possible. From

Conclusion

In order to have a successful fire program in wilderness, it is critical to recognize and be able to explain the general goals for the wilderness resource. Specific wilderness objectives may vary depending on the complexities of each wilderness; therefore, managers need to communicate and clearly define those wilderness objectives.

Once the wilderness objectives are clear, managers should organize applicable scientific information and address the specific risks involved in a fire program. Sharing and addressing risks will increase the confidence level of managers.

Although many wildernesses can currently use lightning-caused fires to achieve wilderness objectives, it may be necessary to use management ignitions to prepare a landscape for a prescribed natural fire program in others. For a variety of reasons, managers may need to continue to rely on management ignitions in some of these wildernesses.

When making decisions about a fire program in wilderness, it is important to always keep in mind the definition of wilderness in the Wilderness Act. Wilderness is "... an area ... which is...managed so as to preserve its natural conditions and which generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable."

GOOD LUCK!

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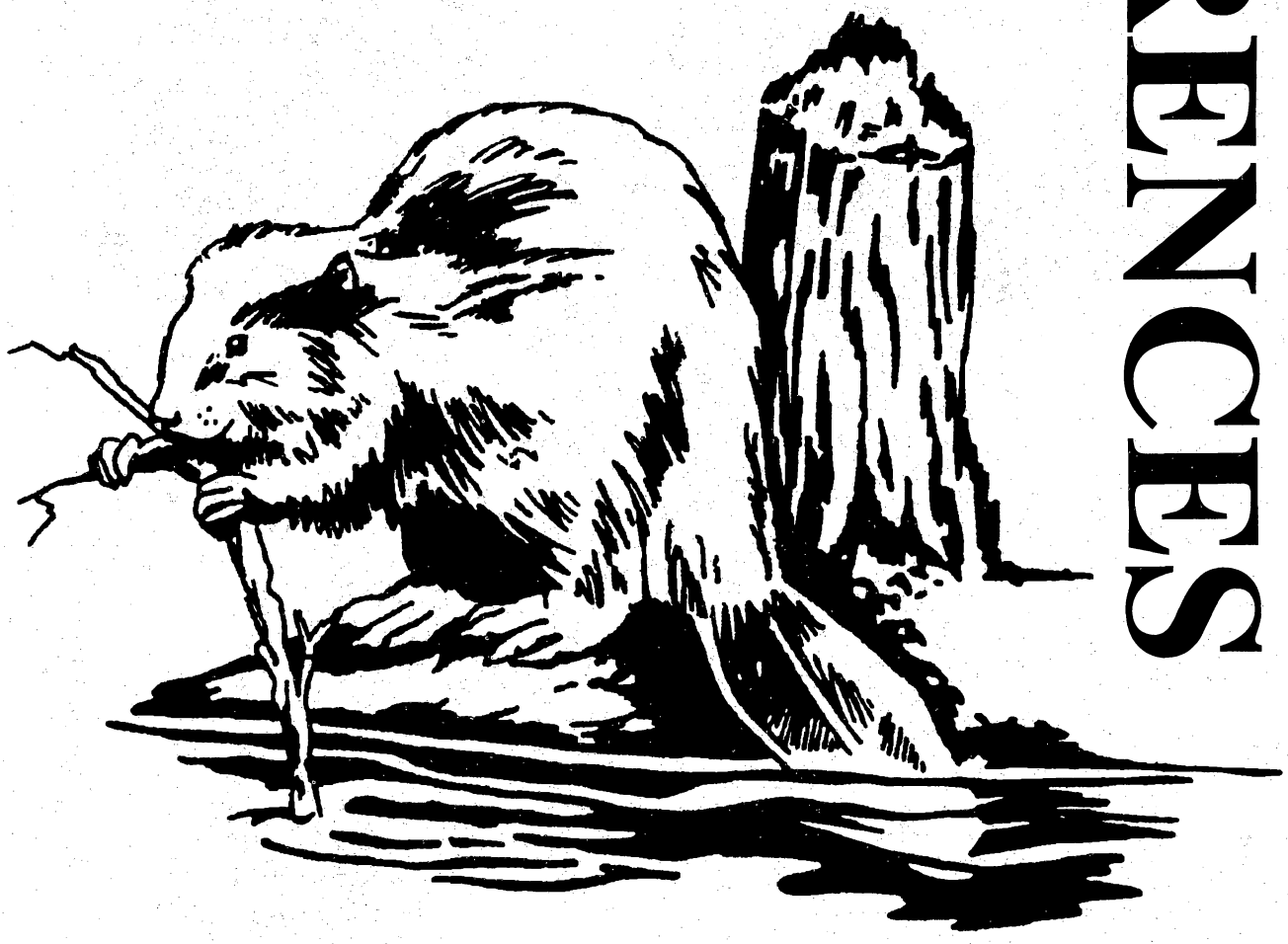
"If we are to have broad-thinking men and women of high mentality, of good physique and with a true perspective on life, we must allow our populace a communion with nature in areas of more or less wilderness condition."

Arthur Carhart



Glossary of Terms

Appropriate Suppression Response — The planned strategy for suppression action, in terms of kind, amount, and timing, on a wildfire which most efficiently meets fire management direction under current and expected burning conditions. The response may range from a strategy of prompt control to one of containment, confinement, or surveillance.

Biomass — The total amount of living material, plant and animal, supported by an area.

Burn Plan — Provides the go/no go parameters for natural ignitions as well as the sideboards for monitoring managed natural fires.

Burning Period — (Fireline Handbook-NWCG) That part of each 24-hour period when fires spread most rapidly, typically from 1000 hours to sundown.

Class I Air Quality Areas — (Clean Air Act) Those Wildernesses over 5000 acres which were in existance as of August 7, 1977 (including expansions to those wildernesses which occured after that date).

Confine — To limit fire spread within a predetermined area principally by use of natural or preconstructed barriers or environmental conditions.

Contain — (Fireline Handbook-NWCG) - To take suppression action, as needed, which can reasonably be expected to check the fire's spread under prevailing conditions.

Control — To complete a fire line around the fire, any adjacent spot fires, and interior islands to be saved; burn out any unburned areas adjacent to the fire side of the line; and cool down all hot spots that are immediate threats to the line, until it can be reasonably expected to hold under foreseeable conditions.

Ecosystems — Includes all the organisms of an area, their environment, and the linkages or interactions between them. All parts of an ecosystem are interrelated. The fundamental unit in ecology, containing both organisms and abiotic environments, each influencing the properties of the other and both necessary for the maintenance of life.

Escaped Fire — A fire which has exceeded initial attack capabilities.

Escaped Fire Situation Analysis — A decision analysis process from which a plan of action to suppress a fire will be developed. The analysis required development of alternative suppression strategies, and identifies the probable cost associated with each.

Fire Management Action Plan (FMAP)

(Forest Service) - The fire implementation schedule that documents the fire management program for the approved Forest Plan alternative.

Fire Management Activity Plan (FMAP)

The fire management function plan that defines the most economically efficient organization (equipment, facilities, and workforce) in numbers and dollars that are necessary to meet fire management objectives derived from the land management objectives. This is the second tier in BLM's land use planning.

Fire Management Unit

A distinct part of the fire management area that can be recognized and mapped from its external features.

Fire Management Zone

All the land within a fire management area that has in common a particular characteristic.

Fire Regimes

The kind of fire and prominent immediate effects of fire that characterize an ecosystem.

Fire Situation Analysis

(National Park Service) - A process used to evaluate the daily situation on a fire, current fire behavior, projected growth for the 24 hours, current and anticipated weather, identified concerns and values threatened, and recommended management action.

(Forest Service) - A decision analysis process used to evaluate initial suppression action on each wildfire uncontrolled for multiple burning periods while under initial attack.

Fuel Loading

The amount of fuels in a given area, usually expressed in tons per acre. Fuel loadings may be referenced to fuel size or timelag categories; and may include surface or total fuels.

Fuel Treatement

Activities altering fuel loading through removal, isolation, burning or mechanical altering (chopping, lopping, etc.).

Interdisciplinary Team

A team of agency personnel representing several disciplines that integrates knowledge of the physical, biological, economic, and social sciences. The team must consider problems collectively rather than separating them along disciplinary lines.

Limited Suppression

Asuppression category used extensively in Alaska, recognizes areas where the cost and/or environmental impacts of suppression actions exceed the value of the resources being protected. Suppression actions are initiated only to the extent necessary to keep a fire within the management unit or to protect identified higher value areas/sites.

Management Ignited An ignition put into place by a planned, deliberate management action.

Maximum Allowable Perimeter (Forest Service) - The limits of acceptable burned area for a prescribed natural fire, based on either land and resource management constraints or the fire management organization's capability, and representing a reasonably defensible location from a fire management standpoint.

Minimum Tool Rule Apply only the minimum impact policy, device, force, regulation, instrument, or practice to bring about a desired result. Achieve results using the most "light-handed" approach.

MIST (Minimum Impact Suppression Techniques) The application of strategy and tactics that effectively meet suppression and resource objectives with the least environmental, cultural and social impacts.

Natural Ignition An ignition started at random by any natural cause.

Prescribed Fire A fire burning within prescription to achieve land use objectives resulting from management ignited or natural ignition.

Prescribed Fire Manager Responsible directly to the Forest Supervisor for implementation, coordination and on-going management of the assigned prescribed natural fire.

Prescribed Fire Monitor Reports to the fire manager and is responsible for observing, measuring and documenting fire behavior, smoke conditions, weather and fuels and communicating these to the fire manager.

Prescribed Natural Fire A fire resulting from a natural ignition and designated and managed as a prescribed fire.

Prescription A written statement defining objectives to be attained as well as temperature, humidity, wind direction and wind speed, fuel moisture content, and soil moisture under which the fire will be allowed to burn, generally expressed as acceptable ranges of the various indices, and describing the geographic area to be covered.

Programmatic Level Planning This planning level defines what is to be achieved (desired condition and standards) and how progress will be measured (monitoring indicators). Programmatic plan forms the basis for what types of human activities (including management activities) may occur, but it does not mean that any particular activity must occur. Each agency has their own name for the programmatic level plan: USF&WS - Comprehensive Plan, BLM - Resource Management Plan, NPS - General Management Plan, USFS - Forest Land and Resource Management Plan.

Resource Advisor A Resource Advisor is a representative of the unit manager assigned to an Incident Management Team to advise them on issues and concerns specific to the area of the incident. The Resource Advisor should be familiar with the land, resource values at risk, local political concerns, Land Management Plan, and policy directions and have some knowledge of fire suppression strategies and tactics applicable to the incident.

Risk Assessment Assessment conducted to determine whether a new ignition can be managed as a prescribed natural fire or declared a wildfire. Assessment includes such factors as: fuel and weather conditions, drought severity, fire status in other areas, availability of personnel.

Untrammeled Unconfined, unconstrained, not interfered with.

Wildfire Any fire occurring on wildland that is not meeting management objectives and thus requires a suppression response.

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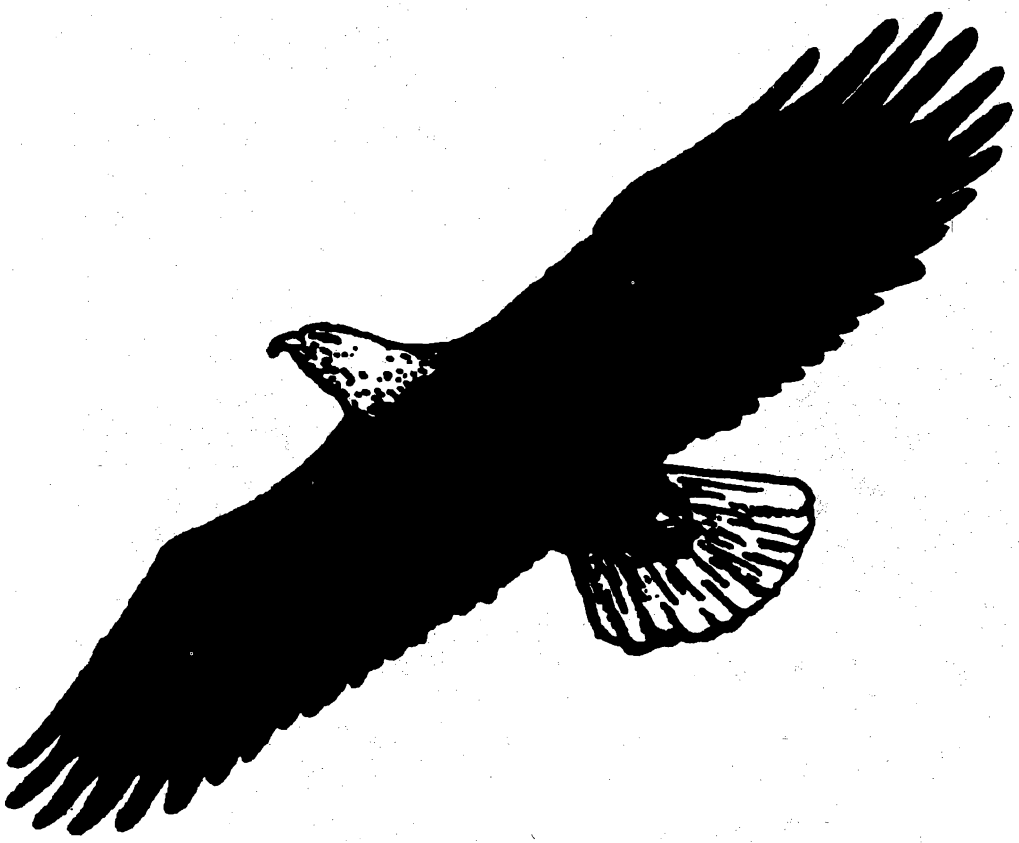
APPENDICES



"There is just one hope of repulsing the tyrannical ambition of civilization to conquer every inch on the whole earth.
That hope is the organization of spiritual people who will fight for the freedom and preservation of wilderness."

Bob Marshall

Laws

Numerous laws need to be considered when planning for a prescribed fire program in wilderness. Some of these laws apply to all federally-designated wildernesses and others apply to a specific wilderness or resource within wilderness. The following list is not complete but suggests the range of laws that should be recognized when designing a prescribed fire program in wilderness:

Wilderness Act (1964)

National Environmental Policy Act (1969)

Clean Air Act (1990)

Clean Water Act (amended 1972)

Endangered Species Acts of 1973, 1978, 1982

Archeological Resources Protection Act

National Historic Preservation Act (1980)

The Antiquities Act of 1906

Wild & Scenic Rivers Act (1968)

National Forest Management Act

"Eastern" Wilderness Act (1975)

Alaska National Interest Lands Conservation Act (1980)

Individual Wilderness Bills

American Indian Religious Freedom Act

Native American Graves Protection and Repatriation Act

Safe Drinking Water Act (1977)

Cave Resources Protection Act

Migratory Bird Treaty Act

Federal Advisory Committee Act

Wild Horses and Burros Protection Act

General Mining Act (1872)

Federal Land Policy and Management Act (1976)

Alaska Native Claims Settlement Act (ANCSA 1971)

Multiple Use - Sustained Yield Act (1960)

5 Appendix

Related laws affecting wilderness management

Below are brief descriptions of some of the laws most frequently referred to in wilderness management.

General Mining Act of 1872

Enacted to promote the development of mining resources in the United States. This act declared the public lands free and open to mineral exploraton and purchase, and all lands with valuable mineral deposits open for occupancy. Established the procedure for mining claims and operations. Though it is over 100 years old, this act still influences management in some wilderness areas with mineral resources.

Multiple-Use, Sustained Yield Act (1960)

Clarifies policy of the Forest Service in managing the national forest—to be administered for outdoor recreation, range, timber, watershed, wildlife and fisheries. The Secretary of Agriculture was directed to administer the renewable surface resources of the forests for multiple use and sustained yield, to best meet the needs of the American people.

Wilderness Act (1964)

Established a national wilderness system, administered by four federal agencies. The purpose of the act was to preserve and protect these areas in their natural condition, and for the use and enjoyment of present and future generations. Part of this act defines management guidelines in wilderness areas, describing allowed and prohibited uses and other management conditions. Initially, the Wilderness Act included 54 areas with over 9 million acres, and established the framework for adding future areas.

Wild and Scenic Rivers Act (1968)

Established a national system of rivers to be preserved in free-flowing condition, with their immediate environments protected. Congress established an initial system of eight rivers with outstandingly remarkable values, and set up methods and procedures for adding new rivers to the system. There are three classifications of rivers in the system: wild, scenic, or recreational depending on the level of development near the stretch of river.

National Environmental Policy Act of 1969

Enacted to encourage productive and enjoyable harmony between humans and their environment, to promote efforts which will prevent or eliminate damage to the environment, to stimulate the health and welfare of human beings and to enrich our understanding of ecological systems and natural resources. This Act established the Council on Environmental Quality and set up procedures for preparation of environmental impact statements on any major federal action significantly affecting the quality of the human environment.

Endangered Species Acts of 1973, 1978, 1982

Enacted to provide a program for the conservation of wildlife and plant species that are threatened or endangered with extinction. The Act recognizes that several species are in danger of extinction, and these species are of esthetic, ecological, educational, historical, recreational and scientific value. The act sets up specific procedures to determine which plant and animal species are added or removed from protective status. It also sets up cooperative programs with states, and civil penalties for violation of the act. Subsequent amendments to this act were made in 1978 and 1982.

"Eastern" Wilderness Act (1975)

Added areas in the eastern United States (east of the 100th meridian) to the National Wilderness Preservation System. Although many of these eastern areas are smaller than those in the west, and have had more historic human influences, they are to be managed in a consistent manner with all wilderness areas. Unlike the Wilderness Act, this legislation allowed the power to condemn private lands in these areas and authorized funding to purchase private lands.

Alaska National Interest Lands Conservation Act (1980)

This act provided for designation and conservation of certain public lands in Alaska. The bill added about 56 million acres to the National Wilderness Preservation System in 35 areas administered by the National Park Service, U.S. Fish and Wildlife Service, and U.S. Forest Service. Also added were several Wild and Scenic Rivers to the national system. It was the intent of Congress to preserve unrivaled scenic and geological values associated with natural landscapes, and to preserve vast unaltered arctic tundra, boreal forest, and coastal rainforest ecosystems. Another major purpose was to protect wildlife habitat for species dependent on large undeveloped areas.

Clean Air Act of November 1990

The Federal Land Manager is responsible under Section 165 of the Clean Air Act (CAA) to protect the air quality related values of Class I air quality areas and to review air quality permit applications for new and modified sources that may impact Class I areas. The primary regulations that affect new major sources and modifications are the Prevention of Significant Air Quality Deterioration (PSD) regulations (40 CFR 52.21). The goals of the PSD program are "to protect, preserve, and enhance the air quality in national parks, national wilderness areas, national monuments, national seashores, other areas of special national or regional national, recreational, scenic, or historic value: (see CAA, Section 160). The Air Quality Branch is responsible for reviewing PSD permit applications for sources that may potentially impact Class I and Class II areas administered by the Federal Land Manager.

Individual Wilderness Bills (1978, 1980, 1982, 1983, 1984)

Since 1964, there have been numerous state wilderness bills passed throught the country. The National Wilderness Preservation System currently consists of 641 units covering nearly 104 million acres.

Wilderness Act

Act of September 3, 1964,
(P.L 88-577, 78 Stat. 890; 16 U.S.C. 1 1 21 (note), 1 1 31-1136)

Sec 1. This Act may be cited as the "Wilderness Act" (I 6 U.S.C. 1 1 21 (note))

Sec. 2. (a) In order to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify, all areas within the United States and its possessions, leaving no lands designated for preservation and protection in their natural condition, it is hereby declared to be the policy of the Congress to secure for the American people of present and future generations the benefits of an enduring resource of wilderness. For this purpose there is hereby established a National Wilderness Preservation System to be composed of federally owned areas designated by Congress as "wilderness areas", and these shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so so to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness; and no Federal lands shall be designated as "wilderness areas" except as provided for in this Act or by a subsequent Act.

(b) The inclusion of an area in the National Wilderness Preservation System notwithstanding, the area shall continue to be managed by the Department and agency having jurisdiction thereover immediately before its inclusion in the National Wilderness Preservation System unless otherwise provided by Act of Congress. No appropriation shall be available for the payment of expenses or salaries for the administration of the National Wilderness Preservation System as a separate unit nor shall any appropriations be available for addition personnel stated as being required solely for the purpose of managing or administering areas solely because they are included within the National Wilderness Preservation System.

(c) A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has a least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological or other features of scientific, educational, scenic, or historical value. (16 U.S.C. 1131)

PREVIOUSLY CLASSIFIED AREAS

Sec. 3. (a) All areas within the national forests classified at least 30 days before the effective date of the Act by the Secretary of Agriculture or the Chief of the Forest Service as 'wilderness', 'wild" or "canoe" are hereby designated as wilderness areas. The Secretary of Agriculture shall--

(1) Within one year after the effective date of this Act, file a map and legal description of each wilderness area with the Interior and Insular Affairs Committees of the United States Senate and House of Representatives, and such descriptions shall have the same force and effect as if included in this Act: Provided however, That correction of clerical and typographical errors in such legal descriptions and maps may be made.

(2) Maintain, available to the public, records pertaining to said wilderness areas, including maps and legal descriptions, copies of regulations governing them, copies of public notices of, and reports submitted to Congress regarding pending additions, eliminations, or modifications. Maps, legal descriptions, and regulations pertaining to wilderness areas within their respective jurisdictions also shall be available to the public in the offices of regional foresters, national forest supervisors, and forest rangers.

(b) The Secretary of Agriculture shall, within ten years after the enactment of this Act, review, as to its suitability or nonsuitability for preservation as wilderness, each area in the national forests classified on the effective date of this Act by the Secretary of Agriculture or the Chief of the Forest Service as "primitive" and report his finding to the President. The President shall advise the United States Senate and House of Representatives of his recommendations with respect to the designation as "wilderness" or other reclassification of each area on which review has been completed, together with maps and a definition of boundaries. Such advice shall be given with respect to not less than one-third of all the areas now classified as "primitive" within three years after the enactment of this Act, not less than two-thirds within seven years after the enactment of this Act, and the remaining areas within ten years after the enactment of this Act. Each recommendation of the President for designation as "wilderness" shall become effective only if so provided by an Act of Congress. Areas classified as "primitive" on the effective date of this Act shall continue to be administered under the rules and regulations affecting such areas on the effective date of this Act until Congress has determined otherwise. Any such area may be increased in size by the President at the time he submits his recommendations the Congress by not more than five thousand acres with no more than one thousand two hundred and eighty acres of such increase in any one compact unit; if it proposed to increase the size of any area by more than five thousand acres or by more than one thousand two hundred and eighty acres in any one compact unit the increase in size shall not become effective until acted upon by Congress. Nothing herein contained shall limit the President in proposing, as part of his recommendations to Congress, the alteration of existing boundaries of primitive areas or recommending the addition of any contiguous area of national forest lands predominately of wilderness value. Notwithstanding any other provisions of this Act, the Secretary of Agriculture may complete his review and delete such area as may be necessary, but not to exceed seven thousand acres, from the southern tip of the Gore Range-Eagles Nest Primitive Area, Colorado, if the Secretary determines that such action is in the public interest.

(c) Within ten years after the effective date of this Act the Secretary of the Interior shall review every roadless area of five thousand contiguous acres or more in the national parks, monuments and other units of the national park system and every such areas of, and every roadless island within, the national wildlife refuges and game ranges, under his jurisdiction on the effective date of this Act and shall report to the President his recommendation as to the suitability or nonsuitability of each such area or island for preservation as wilderness. The President shall advise the President of the Senate and the Speaker of the House of Representatives of his recommendation with respect to the designation as wilderness of each such area or island on which review has been completed, together with a map thereof and a definition of its boundaries. Such advice shall be given with respect to not less than one-third of the areas and islands to be reviewed under this subsection within three years after enactment of this Act, not less than two-thirds within seven years of enactment of this Act, and the remainder within ten years of

enactment of this Act. A recommendation of the President for designation as wilderness shall become effective only if so provided by an Act of Congress. Nothing contained herein shall, by implication or otherwise, be construed to lessen the present statutory authority of the Secretary of the Interior with respect to the maintenance of roadless areas within the national park system.

(d)(1) The Secretary of Agriculture and the Secretary of the Interior shall, prior to submitting any recommendations to the President with respect to the suitability of any area for preservation as wilderness--

(A) give such public notice of the proposed action as they deem appropriate, including publication in the Federal Register and in a newspaper having general circulation in the area or areas in the vicinity of the affected land;

(B) hold a public hearing or hearings at a location or locations convenient to the areas affected. The hearings shall be announced through such means as the respective Secretaries involved deem appropriate, including notices in the Federal Register and in newspapers of general circulation in the area: Provided, That if the lands involved are located in more than one State, at least one hearing shall be held in each State in which a portion of the land lies;

(C) at least thirty days before the date of a hearing advise the Governor of the State and the governing board of each county, or in Alaska the borough, in which the lands are located, and Federal departments and agencies concerned, and invite such officials and Federal agencies to submits their views on the proposed action at the hearing or by no later than thirty days following the date of the hearing.

(2) Any views submitted to the appropriate Secretary under the provisions of (1) of this subsection with respect to any area shall be included with any recommendations to the President and to Congress with respect to such area.

(e) Any modification of adjustment of boundaries of any wilderness area shall be recommended by the appropriate Secretary after public notice of such proposal and public hearing or hearings as provided by in subsection (d) of this section. The proposed modification or adjustment shall then be recommended with map and description thereof to the President. The President shall advise the United States Senate and the House of Representatives of his recommendations with respect to such modification or adjustment and such recommendation shall become effective only in the same manner as provided for in subsections (b) and (c) of this section. (16 U.S.C. 1132)

LIMITATION OF USE AND ACTIVITIES

Sec. 4. (a) The purposes of this Act are hereby declared to be within and supplemental to the purposes for which national forests and units of the national park and national wildlife refuge systems are established and administered and--

(1) Nothing in this Act shall be deemed to be in interference with the purpose for which national forests are established as set forth in the Act of June 4, 1897 (30 Stat. 1 1), and the Multiple-Use Sustained-Yield Act of June 12, 1960 (74 Stat. 215).

(2) Nothing in this Act shall modify the restrictions and provisions of the Shipstead-Nolan Act (Public Law 539, Seventy-first Congress, July 10, 1930; 46 Stat. 1020), the Thye-Blatnick Act (Public Law 733, Eightieth Congress, June 22, 1948; 62 Stat. 568), and the Humphrey-Thye-Blatnik-Andresen Act (Public Law 607, Eighty-fourth congress, June 22, 1956; 70 Stat. 326), as applying to the Superior National Forest or the regulations of the Secretary of Agriculture.

(3) Nothing in this Act shall modify the statutory authority under which units of the national park system are created. Further, the designation of any area of any park, monument, or other unit of the national park system as a wilderness area pursuant to this Act shall in no manner lower the

standards evolved for the use and preservation of such park, monument, or other unit of the national park system in accordance with the Act of August 25, 1916, the statutory authority under which the area was created, or any other Act of Congress which might pertain to or affect such area, including, but not limited to, the Act of June 8, 1906 (34 Stat. 225; 16 U.S.C. 432 et seq.); section 3(2) of the Federal Power Act (16 U.S.C. 796(2)); and the Act of August 21, 1935 (49 Stat. 666; 16 U.S.C. 461 et seq.).

(b) Except as otherwise provided in this Act, each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area and shall so administer such area for such other purposes for which it may have been established as also to preserve its wilderness character. Except as otherwise provided in this Act, wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical use.

(c) Except as specifically provided for in this Act, and subject to existing private rights, there shall be no commercial enterprise and no permanent road within any wilderness area designated by this Act and, except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act (including measures required in emergencies involving the health and safety of persons within the area), there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area.

(d) The following special provisions are hereby made:

(1) Within wilderness areas designated by this Act the use of aircraft or motorboats, where these uses have already become established, may be permitted to continue subject to such restriction as the Secretary of Agriculture deems desirable. In addition, such measures may be taken as may be necessary in the control of fire, insects, and diseases, subject to such conditions as the Secretary deems desirable.

(2) Nothing in this Act shall prevent within national forest wilderness areas any activity, including prospecting, for the purpose of gathering information about mineral or other resources, if such activity is carried on in a manner compatible with the preservation of the wilderness environment. Furthermore, in accordance with such program as the Secretary of the Interior shall develop and conduct in consultation with the Secretary of Agriculture, such areas shall be surveyed on a planned, recurring basis consistent with the concept of wilderness preservation by the Geological Survey and the Bureau of mines to determine the mineral values, in any, that may be present; and the results of such surveys shall be made available to the public and submitted to the President and Congress.

(3) Notwithstanding any other provisions of this Act, until midnight December 31, 1983, the United State mining laws and all laws pertaining to mineral leasing shall, to the same extent as applicable prior to the effective date of this Act, extend to those national forest lands designated by this Act as "wilderness area,; subject, however, to such reasonable regulations governing ingress and egress as may be prescribed by the Secretary of Agriculture consistent with the use of the land for mineral location and development and exploration, drilling, and production, and use of land for transmission lines, waterlines, telephone lines, or facilities necessary in exploring, drilling, producing, mining, and processing operations, including where essential the use of mechanized ground or air equipment and restoration as near as practicable of the surface of the land disturbed in performing prospecting, location, and in oil and gas leasing, discovery work, exploration, drilling, and production, as soon as they have served their purpose. Mining locations lying within the boundaries of said wilderness areas shall be held and used solely for mining or processing operations and uses reasonable incident thereto; and hereafter, subject to valid existing rights, all patents issued under the mining laws of the United States affecting national

forest lands designated by this Act as wilderness areas shall convey title to the mineral deposits within the claim, together with the right to cut and use so much of the mature timber therefrom as may be needed in the extraction, removal, and beneficiation of the mineral deposits, if needed timber is not otherwise reasonable available, and if the timber is not otherwise reasonable available, and if the timber is cut under sound principles of forest management as defined by the national forest rules and regulations, but each such patent shall reserve to the United States all title in or to the surface of the lands and products there of, and no use of the surface of the claim or the resources therefrom not reasonably required for carrying on mining or prospecting shall be allowed except as otherwise expressly provided in the Act: *Provided,* That unless hereafter specifically authorized, no patent within wilderness areas designated by this Act shall issue after December 31, 1983, except for the valid claims existing on or before December 31, 1983. Mining claims located after the effective date of this Act within the boundaries of wilderness areas designated by this Act shall create no rights in excess of those rights which may be patented under the provisions of this subsection. Mineral leases, permits, and licenses covering lands within national forest wilderness areas designated by this Act shall contain such reasonable stipulations as may be prescribed by the Secretary of Agriculture for the protection of the wilderness character of the land consistent with the use of the land for the purposes for which they are leased, permitted, or licensed. Subject to valid rights then existing, effective January 1, 1984, the minerals in lands designated by this Act as wilderness areas are withdrawn from all forms of appropriation under the mining laws and from disposition under all laws pertaining to mineral leasing and all amendments thereto.

(4) Within wilderness areas in the national forests designated by this Act, (1) the President may, within a specific area and in accordance with such regulations as he may deem desirable, authorize prospecting for water resources, the establishment and maintenance of reservoirs, water-conservation works, power projects, transmission lines, and other facilities needed in the public interest, including the road construction and maintenance essential to development and use thereof, upon his determination that such use or uses in the specific area will better serve the interests of the United States and the people thereof than will its denial; and (2) the grazing of livestock, where established prior to the effective date of this Act, shall be permitted to continue subject to such reasonable regulations as are deemed necessary by the Secretary of Agriculture.

(5) Other provisions of this Act to contrary notwithstanding, the management of the Boundary Waters Canoe Area, formerly designated as the Superior, Little Indian Sioux and Caribou Roadless Areas, in the Superior National Forest, Minnesota, shall be in accordance with regulations established by the Secretary of Agriculture in accordance with the general purpose of maintaining, without unnecessary restrictions on other uses, including that of timber, the primitive character of the area, particularly in the vicinity of the lakes, streams, and portages: Provided, That nothing in this Act shall preclude the continuance within the area of any already established use of motorboats.

(6) Commercial services may be performed within the wilderness areas designated by this Act to the extent necessary for activities which are proper for realizing the recreational or other wilderness purposes of the areas.

(7) Nothing in this Act shall constitute an express or implied claim or denial on the part of the Federal Government as to exemption from State water laws.

(8) Nothing in this Act shall be construed as affecting the jurisdiction or responsibilities of the several States with respect to wildlife and fish in the national forests (16 U.S.C. 1133)

5 Appendix

RIGHTS OF NON-FOREST LANDS OWNERSHIP

Sec. 5. (a) In any case where State-owned or privately owned land is completely surrounded by national forest lands with areas designated by this Act as wilderness, such State or private owner shall be given such rights as may be necessary to assure adequate access to such State-owned or privately owned land by such State or private owner and their successors in interest, or the State-owned land or privately owned land shall be exchanged for federally owned land in the same State of approximately equal value under authorities available to the Secretary of Agriculture: Provided, however, That the United States shall not transfer to a State or private owner any mineral interests unless the State or private owner relinquishes or causes to be relinquished to the United States the mineral interest in the surrounded land.

(b) In any case where valid mining claims or other valid occupancies are wholly within a designated national forest wilderness area, the Secretary of Agriculture shall, by reasonable regulations consistent with the preservation of the area of wilderness, permit ingress and egress to such surrounded areas by means which have been or are being customarily enjoyed with respect to other such areas similarly situated.

(c) Subject to the appropriation of funds by Congress, the Secretary of Agriculture is authorized to acquire privately owned land within the perimeter of any area designated by this Act as wilderness if (1) the owner concurs in such acquisition or (2) the acquisition is specifically authorized by Congress (16 U.S.C. 1134)

GIFTS AND DONATIONS

Sec. 6. (a) The Secretary of Agriculture may accept gifts or bequests of land within wilderness areas designated by this Act for preservation as wilderness. The Secretary of Agriculture may also accept gifts or bequests of land adjacent to wilderness areas designated by this Act for preservation as wilderness if he has given sixty days advance notice thereof to the President of the Senate and the Speaker of the House of Representatives. Land accepted by the Secretary of Agriculture under this section shall become part of the wilderness area involved. Regulations with regard to any such land may be in accordance with such agreements, consistent with the policy of this Act, as are made at the time of such gift, or such conditions, consistent with such policy, as may be included in, and accepted with, such bequest.

(b) The Secretary of Agriculture or the Secretary of the Interior is authorized to accept private contributions and gifts to be used to further the purposes of this Act. (16 U.S.C. 1135)

REPORT TO CONGRESS

Sec. 7. At the opening of each session of Congress, the Secretaries of Agriculture and Interior shall jointly report to the President for transmission to Congress on the status of the wilderness system, including a list and descriptions of the areas in the system, regulations in effect, and other pertinent information, together with any recommendations they may care to make. (16 U.S.C. 11 36)

APPROVED SEPTEMBER 3, 1964.

Legislative History:

House Reports:

No 1538 accompanying H.R. 9070 (Committee on Interior & Insular Affairs) and No. 1829 (Committee of Conference).

Senate report:

No. 109 (Committee on Interior & Insular Affairs). Congressional Record:

Vol. 109 (1963): April 4, 8, considered in Senate.
April 9, considered and passed Senate.

Vol. 110 (1964): July 28, considered in House.
July 30, considered and passed House, amended, in lieu of H.R. 9070
August 20, House and Senate agreed to conference report.